THE MARINE REVIEW

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DRY DOCK BIDS REJECTED.

The bids recently submitted to the navy department for the construction of the big dry dock at Puget Sound navy yard have been rejected and Truman H. Newberry, acting secretary of the navy, will ask congress to increase the appropriation from $1,250,000 to $1,600,000. None of the bids submitted included the completion of the dry dock as desired by the navy department and the lowest bids did not provide for the pumping apparatus, capstan or other necessary appliances. Furthermore, the dock provided for in the appropriation is not large enough to accommodate such vessels as will constitute the navy in the future and it is desired to have the specifications altered to provide a larger dock.

The following are the general dimensions of the dock as specified in the proposals:

	Ft.	In.
Length of dock on center line at coping level from outside at head to end of apron	727	0
Length of dock at coping level from inside of coping at head to outer sill	675	0
Length of dock on floor from head to outer sill	653	0
Length of floor from head to abutment	608	0
Width in body of dock at coping (least)	135	0
Width between faces of altars at sill level (least)	95	0
Width between faces of lowest altars (least)	82	0
Width of entrance at coping level	115	0
Width of entrance at level of mean high water	115	0
Depth, on center line, coping to floor of dock (greatest)	47	7
Depth, on center line, coping to floor of dock (least)	46	7
Depth, coping level to sill of dock	45	0
Depth, mean high water to sill of dock	38	0

The following bidders submitted proposals for the construction of the dock, the amounts of the bids being appended.

F. McLellan & Co., Inc., Seattle, Wash.	$1,192,284.39
International Contract Co., Seattle, Wash.	1,594,140.00
Independent Asphalt Paving Co., Seattle, Wash.	1,240,000.00
William Norton Corcoran, San Francisco, Cal.	1,730,862.00
The Scofield Co., Philadelphia, Pa.	1,602,000.00

NEW ANCHOR LINER.

The Anchor Line Steamship Co., who have added to their fleet during the last few years the steel twin-screw passenger steamers Columbia and Caledonia, have now built another vessel of the same class, named the California. The California was launched at Meadowside, Partick, on July 9, 1907, and the vessel will be all ready and fully equipped in every particular to take her place in the regular service of the company in good time for the autumn and winter season of 1907. The new steamer is 485 ft. in length over all, by 58 ft. molded breadth, and 36.6 ft. deep to the tonnage deck, with a gross tonnage of 9,000 tons, and, when fully loaded, her displacement will be not less than 15,000 tons. The first-class accommodation is situated amidships, with state-rooms for 250 passengers in the promenade, bridge, and main decks. The main saloon is situated on the upper deck, well lighted and ventilated, and heated by radiators. Above the main saloon, on the bridge deck, is the library, a room measuring 30 ft. by 40 ft. The main staircase extends to the four decks. On the promenade deck is the smoking room. The second-class accommodation is also amidships, towards the after end of the vessel, with staterooms on the poop and main deck for about 400 passengers. The second-class dining saloon is on the upper deck. The ladies' room, or library, is directly above the saloon. On the promenade deck there is a second-class smoking room. In the first and second-class accommodation the stairways, corridors, saloon entrances, and other places where there is most traffic, are floored with patent rubber tiles. A complete system of natural and mechanical ventilation has been fitted throughout the entire vessel, and electric fans have been placed wherever they are required. The captain and officers have been berthed altogether in adjoining rooms on the boat deck, altogether apart from the passengers, but adjacent to the navigation bridge. Third-class passengers' accommodation is situated on the main and 'tween decks for 600 persons, a number of separate cabins being provided for these passengers on the main deck and after 'tween decks. The third-class accommodation is altogether of a superior character to that usually obtained. The California is propelled by two sets of powerful triple-expansion engines, supplied by the builders, with cylinders 27½ in., 46 in., and 75 in. in diameter, respectively, by 4-ft. 5-in. stroke. There are four double-ended boilers and one single-ended boiler. The vessel is designed to carry a large cargo.

BOSTON'S FLOATING HOSPITAL.

The Boston Floating Hospital, Inc., 54 Devonshire street, Boston, Mass., is the owner of a vessel of unique characteristics, which is employed in giving trips about the harbor to the sick and needy residents of the congested districts of the city. The craft is known as the Boston Floating Hospital and was launched July 7, 1906. During that season she was without motive power and made her trips in tow of a tug but this season she was fitted with twin-screw engines and now attains a speed of eight miles an hour.

The floating hospital was built at the Atlantic Works, East Boston, Mass., from designs by Burgess & Packard, Boston, and is of steel construction. She is 170 ft. in length over all, beam, molded, 45 ft., and depth at side, molded, 10 ft. 8 in., with a gross tonnage of 594.

The hull is divided into seven water-tight compartments. The vessel is equipped with all necessary machinery for lighting, refrigeration and ventilation. Her main engines are of the vertical, double-acting, compound, surface condensing type with Joy valve gear and were built originally by the Fore River Ship Building Co., Quincy, Mass., for the steam yacht Pilgrim. They are of 10 and 18 in. cylinder diameters by 14 in. stroke, and develop 100 H. P. each. Steam is furnished by two cylindrical Scotch boilers 9 ft. by 8 ft. 9 in., allowed 120 pounds pressure. The cost of constructing this floating hospital totaled $150,000.

OSAKA SHOSEN KAISHA'S REPORT.

The following address of Mr. Nakahashi, president of the Osaka Shosen Kaisha is of great interest to American readers as revealing what can be done for merchant marine under governmental encouragement:

You might wonder why we have not been able to make a better showing in earning with so much tonnage of steamers and with a fair amount of traffic. In a word, this unfavorable result is due to the over-supply of tonnage as the result of an increase made during the Russo-Japanese War. As you know from reports of newspapers and Government statistics, the Japanese tonnage increased from 600,000 tons in 1903 to nearly one million tons in 1906. During the period from 1896 to 1905, although there has been some fluctuations from time to time, the foreign commerce of Japan has been prosperous, and demanded an increase of shipping tonnage from 30,000 to 50,00 tons per annum. While the increase of some 300,000 tons needed some seven years, an increase of a similar amount was made in two years during the war. In 1904 a great demand was created by the war for the transportation of troops and ammunition and even those who had not been hitherto engaged in shipping business bought new tonnage, in order to lend it to the Government—hence, an almost instant increase of 300,000 tons. This increase did not affect our earning during the war, for not only the newly added ships, but also a large part of those existing before the war were taken up for war purposes by the Government, leaving a shortage of tonnage to attend to the need of commerce. But no sooner had the war ended at the later part of 1905 than these ships were released by the Government, and, at the beginning of 1906 some 200,000 tons were put into the market competing for traffic. You can well imagine the result of such an enormous increase of tonnage in a limited sphere of trade of this small empire. Naturally the freight rates declined by 20 per cent or even 40 per cent in extreme cases. If we could make 10 to 15 per cent gross earnings on freight we should have been able to declare a dividend nearly as good as in usual years. But with such a decline of rates on the one hand and the appreciation of price of commodities on the other, the net profit fell short of making any dividend. Both foreign and domestic commerce has fortunately increased notwithstanding the war, and there is every reason to expect a steady growth after the war; so had the increase of shipping tonnage been at the rate of 50,000 or 80,000 tons per annum, we must have been able to maintain freight rates at a profitable basis.

Your directors took caution to curtail the expense of maintaining the service. With that view we held a conference of managers of branch offices twice each in 1905 and 1906; but we regret that although some decrease is seen in our expenditures it did not amount to as much as half of what we expected. It is hardly necessary to remark that the care and assiduity of the offices both on land and sea curtailed expense and increased traffic to a great extent, but the prosperity of the general market, after the war, has been such as to raise the price of general commodities since July, 1905, by 20 to 28 per cent, and neutralized our effort to cut down expenses.

This decline of freight rates and the unprofitable condition of shipping business are not due to the small volume of the traffic movement or depression of commerce. It is only the depression of shipping trade. Except those companies which have ships peculiarly adopted to certain traffic in which no other owners can compete, all the shipowners have been affected by the over-supply of tonnage. I presume you know that other companies could not realize the expected profits, and in that case if dividends were paid at all it was out of reserve funds, etc.

Recently there has been talk of individual shipowners getting together to form a new shipping company under the name of Nihon Kisen Kaisha. The cause of the movement has evidently been prompted by the over-supply of tonnage and the consequent demoralization of rates. So long as the shipping business was profitable on the competitive basis, no such scheme would have been started. The plan is to eliminate the competition and thereby maintain living rates by co-operation. This is one of the symptoms of deplorable condition of shipping trade, and at the same time one of the indications pointing to a better prospect in future. How will this over-supply of shipping turn out in coming years? In my humble opinion, we have seen the worst in the later half of 1906, which we have just passed. I have several reasons to suppose this forecast. In the first place, the progress of our domestic and foreign commerce is remarkable. The movement of passengers and traffic has been rapidly increasing and has well digested the annual increase of tonnage of from 30,000 to 50,000. It is not wild to expect an increase of over 70,000 or 80,000 tons will be needed each year to meet the growing demand of our commerce. The increase of 300,000 tons during the war, sudden as it was, will be nearly equal to the increase of commerce by this time, as it is four years now since the out-break of war, thus making the average annual increase about 75,000 tons. Moreover, many of the ships which were added to our list during the war are the old vessels built in the early eighties, consequently their lease of life is counted. I gather from these facts, that the equilibrium of demand and supply of tonnage will be reached during the year 1907. Granting for a moment that the tonnage is more than the need of our commerce, the competition will be very much less in coming years than it was last year. Having so many lines in different territories your company had to meet competition in several districts. But I am glad to report that as the result of this competition freight agreements were entered into with several owners and the working has been satisfactory for the last few months.

Except the agreement on the Okinawa Line, I am not in a position to make other agreements public, but I shall be able to do so in next general meeting.

The mail subsidy on Formosan and Tairon services will be continued. A substantial increase of mail pay is expected in another territory. A bill is now before the Congress, which will increase the mail pay on the Japan sea coastal service from 140,000 to 300,000 yen. Though this service is not directly conducted by your Company, we have more than one-half of the interest in Oya Kisen Kaisha which perform the service.

After China-Japanese war your company invested a large sum of money in establishing a line to the ports of the Youngtsee river. This was in accordance with the wishes of the Government to have a regular line of Japanese steamers running up the river to the interior so as to facilitate the development of our commerce with that fertile valley. Fortunately, the service has seen a steady growth until at present our foothold in that quarter is quite secure. At the same time, however, European nations were not slow in paying due attention to the growing trade of this territory, and a

number of shipping lines have since been established. In view of this competition the Japanese Government saw the advantage of conducting this trade on a large scale, and have advised the Japanese owneries to consolidate their capital and energy so far as this branch of their business was concerned. The negotiation to this effect has been going on for some time among the interested parties, and was brought very near to a completion this month. The general feature of the scheme is that the Nippon Yusen Kaisha, Osaka Shosen Kaisha, Konan Kisen Kaisha, and Daito Kisen Kaisha will consolidate their business so far as this territory is concerned, and form a new company with a capital of 12,000,000 yen, each company contributing to the share mainly in the form of ships. To the enterprise the Government has agreed to extend a reasonable support, and a bill is now before the Diet proposing a subsidy.

ONE HUNDRED YEARS OF STEAM NAVIGATION.

FROM THE *New York Times.*

This coming Saturday will mark the one hundredth anniversary of the birth of steam navigation. On Aug. 17, 1807, the Clermont, the first steamboat to be run on a commercial basis, cast off f om the dock of the Paulus Hook ferry, New York, and, with a warning blast from a huge tin horn, started on her maiden trip up the Hudson to Albany. Much to the surprise of a skeptical world, the journey was made successfully, and in the startling running time of thirty-two hours. By this pioneer trip, Robert Fulton proved that the steamboat was not the idle dream of crack-brained enthusiasts, but was a practical commercial reality.

Nothing shows more markedly the giant strides with which mechanical engineering and construction have moved during the past one hundred years than a comparison of the crude, lumbering Clermont taking advantage of the tides to make her average speed of five miles an hour, and the projected Robert Fulton, the mammoth steamer that the Albany Day line plans to add to its fleet in 1909, when the joint Hudson-Fulton celebration will take place.

The Clermont was a flat-bottomed boat, with both bow and stern cut sharp to an angle of 60 degrees. There was not a curved line in her entire hull. She was 150 ft. long, 13 ft. wide, and 7 ft. high. She had a passenger capacity of 100. Her draught was 28 in. Her paddle wheels were 15 ft. in diameter, with eight arms or paddles. These arms extended below the bottom of the boat and were a great inconvenience in shoal water. They also extended seven ft. above the deck, and as no paddle boxes were used during the Clermont's first season, there was always a whirling spatter of water near the wheels. A sheet iron chimney towered 25 ft. above the squat boiler. A square-rigged sail was mounted forward and a sort of spanker sail aft. As there was no keel a heavy lee board was suspended from each side to prevent the boat drifting sideways when the sails were hoisted.

SUCCESSOR TO THE CLERMONT.

The new Robert Fulton is to be 415 ft. long, 85 ft. beam, 62 ft. from keel to top of pilot house. Her engines will develop 6,500 H. P. and she will be licensed to carry 6,000 passengers.

When Robert Fulton built the Clermont steam navigation was in about the same stage of its development as aerial navigation is in today. Fulton was not the inventor of the steamboat, neither was the Clermont the first boat to be propelled by steam. Like all great inventions, the steamboat was the cumulative result of the work of many heads and many hands. Jonathan Hull is in all probability the first man to have had a practical conception of a steamboat. In 1737 he took out a patent and published a pamphlet descriptive of a paddle-wheel steamboat. The skepticism of his day proved too much for him, and the project never got any further than the patent and pamphlet stage. In the years that followed there were numerous experiments, the first of which to take practical shape was that of James Rumsey, who, in 1784, constructed a boat that was propelled by a jet of water forced from the stern. He tried it on the Potomac and succeeded in making four miles an hour.

For some years John Fitch of Windsor, Conn., had been trying to utilize steam for the propulsion of vessels. After numerous disappointments and misfortunes, he succeeded in inventing a paddle steamer, a vessel propelled by a series of long paddles suspended from a framework along both sides of the boat and moved by cranks. This boat was built in Philadelphia in 1784, and ran for a number of years on the Delaware river. Fitch also built a boat which was propelled either by the side paddles or a screw-shaped wheel at the stern, and in 1797 made a speed in it of six miles an hour on the Collect, a large pond that formerly covered the present site of the New York Tombs. But Fitch was looked upon as a visionary, and his boats as dangerous toys. He failed in interesting capitalists in his schemes; his boats were left to rot; and he returned to his home in Kentucky to die, a heartbroken man.

In 1787 William Miller of Dalswinton, Scotland, patented a paddle wheel which was turned by hand. Acting on the suggestion of a friend that steam might be used as a motive power, Miller consulted a mechanical engineer by the name of Symington. Together they constructed a steamboat that made three miles an hour when tried on Dalswinton Lake. This eventually led to the commission to build a steamboat that Symington received from Lord Dundas in 1801. The Charlotte Dundas was built, and proved a practical success. It was used on the Forth and Clyde canal, but as the wash from the paddle wheel destroyed the banks its use was discouraged by the owners of the canal.

There was one business man of this period, however, who was not skeptical of the possibilities of steam navigation. This man was Robert R. Livingston, at one time chancellor of the state of New York and afterward minister to France. In 1798 he secured from the New York legislature a monopoly of navigating the waters of New York by steam, provided that within one year he should propel by steam a vessel of twenty tons four miles an hour. This he failed to do, but his faith in the future of steam navigation remained unshaken.

When Livingston became minister to France, he received from his predecessor in office the drawings and specifications that Fitch had taken with him to France in a fruitlesss effort to interest French capitalists in his boat, and that he had put in the keeping of the American minister when he left the country. It was about this time that Livingston made the acquaintance of Robert Fulton, who was then living in Paris. The building of the Clermont five years later was a result of this acquaintance.

At the time of their first meeting Fulton was a young man of 36, and had only recently given up painting to become an engineer. He was born on Nov. 14, 1765, in Little Britain, Penn., of Scotch ancestry. At 17 he was apprenticed to a silversmith in Philadelphia. Later he turned to miniature painting, and it was while engaged in this art that he saw John Fitch's first successful steamboat running on the Delaware. It was to complete his art studies that Fulton

went to London, studying under his fellow-countryman, Benjamin West.

Fulton later spent two years in Devonshire and there met a number of famous scientists. This was the transition period in Fulton's career. At the age of 29 he gave up art and turned his attention to mechanics. He devised a new method for sawing marble, a machine for spinning flax, and a number of other contrivances. But though he is believed to have journeyed to Scotland and there seen Symington's steamboat, his interest does not seem to have been awakened in this new system of navigation until he went to Paris in 1802, and there met the American minister, Livingston.

The latter soon infected the versatile Fulton with this enthusiasm, and together they began to work out plans for the building of a steamboat. Fulton left Paris for the village of Plombieres, through which runs a small stream, and there began a number of experiments which resulted in the building during the next winter of a steamboat. Just a day or two before this new contrivance was to be tested the boat broke in two and sank to the bottom of the stream.

Fulton immediately began work upon a new hull, and within a short time was able to address a letter to the French National Institute, inviting them to witness a trial of his boat. The trial was a success, the craft making about three miles an hour. It is in celebration of this journey that the French people are now holding a maritime exposition at Bordeaux.

Fulton succeeded in getting the plans of this boat before Napoleon, in the hope of interesting him in the use of steam for the propulsion of war vessels. The propect failed to arouse the interest of the great First Consul. It was then decided that Fulton should return to America and build a steamboat to ply on the Hudson. It was a part of this plan to secure from the New York legislature a continuation of the monopoly that Livingston had previously got to navigate with steamboats the waters of the state. Fulton left for England, where he purchased the engine and boiler for his proposed Hudson river boat. In his diary we find these two entries:

"Jan. 21, 1805, to Messrs. Boulton, Watt & Co., for cylinders and parts of the engine, £548.

"March the 18th, to Messrs. Cave & Son, for copper boiler weighing 4,399 pounds, at 2s 2d the pound, £476 11s 2d."

TRIALS OF AN INVENTOR.

There was difficulty in securing permission to ship the engine and boiler out of England. Under March 22, 1805, we find this entry:

"Fee at the treasury on receiving permission to ship the engine to America, £2 14s 6d."

As soon as Fulton arrived in America he began a series of experiments with small blocks of wood to determine what shape of hull would offer the least resistance to the water. It was while engaged in these that he wrote to Dr. William Thornton, questioning the possibility of ever building a steamboat that could travel six miles an hour. In a previous letter, however, written while he was still in France to his friend, Joel Barlow, he predicted a speed of sixteen miles an hour. To this Barlow replied: "I see without consulting Parker you are mad."

As a result of his experiments Fulton decided that the flat-bottomed, sharp-angled, wedge-shaped boat was the correct type, and the plans for this hull of the Clermont were drawn accordingly.

Meanwhile the engine for the proposed boat was held in the custom house six months before the necessary money was raised to release it. Fulton offered one-third of the rights in the boat to any one contributing a proportionate share of the expenses. But "Fulton's Folly," as his proposed boat was called, did not prove an alluring bait for financiers. Livingston contributed a part of the necessary funds; Joel Barlow and Fulton another part, and the balance Fulton raised with difficulty among his friends.

One of the greatest difficulties that Fulton had was in convincing people that a boat could be moved by a paddle wheel. It was argued by those old-timers that the power used to lift up the water by the wheel would about neutralize the propelling force. It is related that one man whom Fulton approached for $1,000 contribution, said:

"Your wheel is no good. It would never work. You talk about making the boat go four miles an hour! That's an unheard of speed. No, sir. With a wheel on your boat she'd stand stock still." But by dint of much talking Fulton finally got the $1,000.

The hull of the Clermont was built by Charles Browne, whose ship yard was at Corlears Hook on the East river. The only serious attention the new boat received during the latter port of her building was from the men of the up-river sailing packets. They made a number of efforts to destroy her, continuing them after the steamboat was in commission. To ram a sailing boat into her was the usual method of operation. Finally, on Aug. 17, 1807, the new boat, which had been named the Clermont, was ready for her trial trip. The boat was moored to the dock of the Paulus Hook ferry, which was at the foot of what is now Barclay street, and which ran to Paulus Hook, now known as Jersey City. The small crowd which had collected did not hesitate to express its opinion that the whole affair would be a fizzle. Mr. Maxwell, who installed the copper boiler that had been brought from London, was busy tinkering with the boiler. Mr. Browne, at whose ship yard the hull had been built, was looking after the bending of the sails. A Mr. Van Lea was adjusting a harpoon gun at the bow of the boat. The purpose of this gun is still a mystery.

At 1 o'clock everything was pronounced in readiness for the eventful voyage, and Mr. Fulton gave the signal to Capt. Rogers to cast off the lines. A loud blast was blown on a huge tin horn suspended in the bow for the purpose of warning nearby river craft. The steam whistle was not introduced until thirty years later. The order to start was passed on to the engineer, Stevens Rogers. There was a strange, creaking, whirring, churning sound, mingled with the hiss of escaping steam. The uncovered, awkward-looking wheels, towering seven feet above the deck on either side, began to turn, throwing a shower of spray on the unwary passengers who were standing near them. A moment of expectancy, and then the wheels suddenly ceased moving—something had gone wrong with the machinery.

The crowd on shore laughed themselves hoarse; it was just as they had expected—the steamboat was a fizzle. The Paulus Hook ferryboat crept by, and the passengers aboard her joined heartily in the jeers. A sailing packet came in close, and the skipper called out: "Will I throw you a line and tow you to 'Albany?" An hour's tinkering with the machinery, and once more the huge paddle wheels began to heave their dripping arms through the air. This time they continued to move, and the 'longshore crowd was soon dropped into the distance. And, better still, the sailing packet was overhauled and shown the heels of the Clermont. The boat was headed 'cross stream into the shadows of the Great Chip Row, now known as the Palisades. Why did they put 'cross stream? The Clermont was simply

dodging an ebb tide. This is what Fulton said in a subsequent letter:

"The distance from New York to Albany is 160 miles; the tide rises as far as Albany; its velocity is, on an average, 1½ miles an hour. We thus have the tide half the time in favor of the boat and half the time against her. The steam engine is of the power of 20 horses; she runs 4½ miles an hour in still water. Consequently, when the tide is 1½ miles an hour in her favor she runs 5¾ miles an hour. When the tide is against her she runs 2¾ miles an hour. When the tides are against us we keep near shore in the eddies, where the current is weak or the eddy in our favor; when the tide is in our favor we take the centre of the stream. In this way our average speed is 5 miles an hour."

By this time Tappan Zee was crossed, night had come on, supper was served, and the passengers all crowded into the after cabin. The new boat had been pretty thoroughly discussed by this time, and the conversation turned on the Salmagund papers, then in the height of their popularity, and on Washington Irving's forthcoming Knickerbocker History of New York. Before turning in for the night every one joined in singing "Ye Banks and Braes of Bonny Doon." It was a gentle compliment to the Scotch ancestry of Mr. Fulton.

The boat had no side lights. Only a flickering candle in a lantern hung at the bow, and another hung at the stern gave warning of the movements of the vessel through the dark. Poughkeepsie was made the next morning, shortly after breakfast. The big tin horn in the bow was blown to give warning to those ashore and afloat that the Clermont was about to make a landing. A very brief stop, and the boat continued her journey, dropping anchor at noon off Clermont, the beautiful country home of Mr. Livingston. Here the boat remained for the rest of the day and through that night.

ROMANCE ON THE CLERMONT.

In the evening Mr. Livingston, who had returned from Europe, and a party of friends came aboard. Mr. Livingston then announced in a little congratulatory speech the engagement of his niece, Miss Harriet Livingston, to Mr. Fulton. About 9 o'clock the next morning the anchor was hauled up and the journey resumed. Albany was reached at 5 o'clock that afternoon. As Fulton said in a letter to his friend Barlow: "The power of propelling boats by steam is now fully proved." And the Clermont started upon her schedule, a regular feature in the river's traffic.

The following advertisement was published in prominent papers along the river:

STEAMBOAT.

For the information of the Public.—The steamboat will leave New York for Albany every Saturday afternoon exactly at 6 o'clock, and will pass: West Point, about 4 o'clock Sunday morning; Newburg, 7 o'clock Sunday morning; Poughkeepsie, 11 o'clock Sunday morning; Esopus, 2 o'clock in the afternoon; Red Hook, 4 o'clock in the afternoon; Catskill, 7 o'clock in the afternoon; Hudson, 8 o'clock in the evening. She will leave Albany for New York every Wednesday morning exactly at 8 o'clock, and pass: Hudson, about 3 in the afternoon; Esopus, 8 in the evening; Poughkeepsie, 12 at night; Newburg, 4 Thursday morning; West Point, 7 Thursday morning. As the time at which this boat may arrive at the different places above mentioned may vary an hour, more or less, according to the advantage or disadvantage of wind and tide, those who wish to come on board will see the necessity of being on the spot an hour before the time. Persons wishing to come on board from any other landing than these here specified can calculate the time the boat will pass, and be ready on her arrival. Inn keepers or boatmen who bring passengers on board or take them ashore from any part of the river will be allowed one shilling for each person.

PRICES OF PASSAGE—FROM NEW YORK.

To West Point	$2.30
To Newburg	3.00
To Poughkeepsie	3.50
To Esopus	4.00
To Red Hook	4.50
To Hudson	5.00
To Albany	7.00

Fulton was a frequent passenger on the Clermont. There was so much curiosity to see him that whenever he was aboard this placard was put over the gangplank:

"The man with the green velvet coat and yellow vest is Robert Fulton, inventor of this steamboat."

And Fulton would conscientiously take a position near this enlightening placard.

The armored cruiser California, which was finished at the Mare Island navy yard owing to the inability of the Union Iron Works to complete her, being tied up indefinitely by strikes, went into commission Aug. 1. Capt. Thomas S. Phelps is in command.

MISCELLANEOUS ITEMS.

Attorney General Bonaparte has recently delivered an opinion that the secretary of the navy is authorized by the law making appropriations for the purchase of submarine boats to divide the contract so as to purchase boats of both the Octopus and Lake types, provided the secretary is satisfied that the Lake boats are the equal of those of the Octopus type.

A meeting of steamship owners was recently held at Seattle, Wash., for the purpose of effecting an organization of ship owners of the Pacific coast. The association will be known as the Ship Owners' Federation of the Pacific Coast and will be made up of the owners of steamships, sailing vessels, steam schooners and also the interests represented by the regular lines. The association is designed to treat with any demands made by labor organizations upon the ship owners.

A plan for a comprehensive improvement of the San Francisco water front has been practically completed by Col. William H. Heuer, of the United States army, corps of engineers. The plan includes the building of 180 modern wharves, which will give sixty miles of berth room for vessels engaged in the commerce of the port. The work is to be done under the direction of the merchants' committee, which has undertaken the task of providing a complete plan for the development of the docks under modern principles.

The final contracts for the construction of the two new battleships authorized at the last session of congress and for which the Fore River Ship Building Co., Quincy, Mass., and the Newport News Ship Building & Dry Dock Co., Newport News, Va., were the successful bidders, were executed August 8, by Acting Secretary of the Navy Newberry and representatives of the companies. The ship to be built by the Newport News company will be known as the Delaware, but the name of the second has not yet been decided upon.

At a sale of obsolete British warships, held at Portsmouth Dockyard recently, the battleship Collingwood, was withdrawn at £2,550, the reserve not having been reached. The following sales were, however, effected: The torpedo gunboat Sheldrake, £3,900, purchased by the Ship Breaking Co., London; the third-class gunboat Tees, £1,750, purchased by Harris Bros., Bristol; Hull No. C 76 (late the Nimrod), £1,350, purchased by Hamley & Son, Plymouth.

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MR. BURTON'S RETIREMENT.

It is probably a settled fact that Hon. T. E. Burton, chairman of the committee on rivers and harbors of the house of representatives, will not again consent to serve in that capacity although Speaker Cannon will make one more effort to endeavor to induce Mr. Burton to reconsider his determination to retire. When Mr. Burton assumed the chairmanship of the rivers and harbors committee it was not considered an especially important position. He has, however, made out of it a position second only in importance to that of the ways and means committee; but only a very few know at what cost this was done. During his entire congressional career Mr. Burton has made waterways a study and he probably knows more about the waterways of the United States than all of the other congressmen put together. As far as the river and harbor bill is concerned, he is the congress of the United States. Such an empire could be won in only one way—by the hardest kind of hard work. Mr. Burton was so familiar with the subject that it was impossible to defeat him in an argument on any provision that was in the bill or out of it. He knew more about the navigable streams of the country than the congressmen through whose district they flowed. Many and many a river and harbor bill has been passed through congress by the sheer weight of his own personal influence. It will be impossible to replace Mr. Burton upon this committee. Even should a man of equal ability be found he is not likely to possess equal diligence. It was a common thing to call at Mr. Burton's apartments in Washington at midnight or later and find him still working upon some detail or other of the river and harbor bill. Such devotion to public service is very rare and such tenacity of purpose is probably rarer still.

Mr. Burton's decision to retire was probably influenced by his wish to engage more actively in general legislation and probably springs also from a real desire to have more time to study the general problem of transportation. He is the chairman of the commission appointed by President Roosevelt to consider the waterways of the country both in relation to water transportation, the railways and the conserving of the forests. The question of transportation is, in many respects, the most important one before the country and is likely to reach an acute stage in the not too distant future. The appointment of this commission by President Roosevelt may yet be one of the wisest acts of his administration. A little while ago James J. Hill, president of the Great Northern railway, stated frankly that the commerce of the country was growing faster than the railroads could handle it, and that, moreover, the railroads were confronted with the important question of increasing cost of operation. Normally the cost per ton of freight moved should diminish as the volume increases but the reverse is true in increased railway traffic beyond a certain point, dictated very largely by the enormously increased cost of terminals. The enlargement of terminals in the great cities involves frightful expense owing to the high price of land and cost of right-of-way as witness the Pennsylvania system is paid $50,000,000 just for an entrance into New York City alone. In some cases terminals cannot be increased at any cost because the land is not available at all. When terminals cannot be increased the end of the freight capacity of that particular railroad is in sight. If the commerce of the country continues to increase in the ratio that has marked it during the past few years, it will be but a short period of time before the railways will be badly congested. The hope of transportation lies in the waterways development and the position which Mr. Roosevelt has given to Mr. Burton is one of the most responsible within his gift.

Many men are mentioned as a successor to Mr. Burton as chairman of the rivers and harbors committee but all as yet is mere conjecture.

CARRYING COAL TO SAN FRANCISCO.

By the process of eliminating the ship from the nation's fiscal policy the American ship in the foreign trade is well nigh extinct; by the process of including the ship in the nation's fiscal policy a coastwise tonnage has been built up that makes the American merchant marine second only to that of Great Britain. The difference between the coastwise trade and the foreign trade is striking. The tonnage enrolled in the coastwise trade is about 6,000,000 tons of which one-half is on the great lakes. The total tonnage enrolled in the foreign trade is about 870,000 tons. The coastwise trade of

the United States includes all the ports in the United States and Hawaii. It should also include the Philippines but they have been excluded since they were acquired and are to be excluded until 1909. Some time ago attention was directed to the fact that the navy department was shipping coal from Norfolk, Va., to San Francisco in foreign vessels in direct violation of the coastwise laws. Now the shipping interests that desire to send coal to the Pacific coast are suggesting that it would not be any great hardship to the American merchant marine if coal shipments to Pacific coast ports were excluded from the operation of the coastwise laws. Therein lies the mischief of permitting an arm of the national government to break the laws of its own country. Foreign steamers are going with great regularity to Norfolk and are leaving for San Francisco in the service of the navy department. It is no wonder that the American citizens with coal to ship to San Francisco want the same privilege that the navy department is taking unto itself. It is true that it costs more to ship coal to San Francisco in an American ship than it does in a foreign ship. The reason for this is plain. The foreign ship is much more cheaply operated than the American ship and therefore can carry freight more cheaply. But if protection is the fiscal policy of this country it should not be set aside for any interest. If applied to all equally it can work no hardship to anyone. The navy department should not be permitted to send coal to the Pacific coast in foreign vessels.

FREIGHT SITUATION.

The general situation on the lakes is still showing the effects of the ore handlers' strike and it will be sometime yet before conditions are restored to a normal basis. Notwithstanding the fact that carriers which do not usually seek the coal trade are carrying up coal, and thus relieving the pressure for ore cargoes, ore is not reaching the docks in sufficient quantities to care for all the vessels that present themselves. Some of the mines are working with part crews and ore is going forward to the docks slowly. August shipments will not establish a record. Dispatch at Lake Erie ports has also been hampered by congestion of vessels. No predictions are made as to the total volume of ore that will be moved this season but it will undoubtedly be sufficient for the needs of the furnaces. There are indications that general production will be less in the next twelve months than it has been in the past twelve and that the tension, one might say strain, that has marked industry for a year or more, will be considerably relieved. Such a condition would lessen the demand for raw material. Shippers have no doubt that the ore reserves will be ample to tide the country over the winter.

'Tis an ill wind that blows no one good. The tie-up in the ore trade had the effect of making the coal shippers easy. Offerings of tonnage have been liberal and a large amount of coal has gone forward, limited in fact only by the capacity of the railways to deliver it to Lake Erie ports. Whatever fear there may have been of a coal shortage in the northwest has now been completely dissipated. The grain and lumber trades are cutting no figure in the market.

IRON SITUATION.

The effect of the recent strike in the Mesabi iron ranges is still being noted in the movement of ore. Difficulty is being met with in recruiting the working force to the number and efficiency prevailing before the trouble, and it is estimated that the shipments at present are not more than 80 per cent of that expected to be brought down at this season. Heavy specifications for plates and shapes on shipbuilding contracts are being filed due to the active boat construction in lake yards. The Illinois and the Carnegie steel companies now have on hand orders for 40,000 tons of plates and shapes for boat construction. Pig iron continues dull with a little weakness apparent in Ironton and southern iron. Generally, however, the situation is unchanged. The report of the conciliation on the bar iron wage scale committee favors the employes in nearly all points. Fall wire business has opened in a brisk manner. Structural material is strong.

SAULT MONOLITH.

The monument which will be erected at Sault Ste. Marie in commemoration of the semi-centennial of the completion of the first canal to commercial use has left the Vermont quarries and is now en route to Sault Ste. Marie. It is loaded upon three cars and its transportation to the upper peninsula is a problem that several railways are working upon. No date has been set for its arrival at the Sault but it will probably reach there within a week or two; nor has any date been set for the dedication of the monument but it will probably be some time during the coming fall. The contractors who are building the foundation for the monument have run into a bed of quicksand which will make it necessary to strengthen the foundation considerably.

DULUTH GRAIN SHIPMENTS.

Duluth, Aug. 14.—Receipts and shipments of grain at port of Duluth-Superior for the week ending Aug. 10 are as follows:

	Receipts.	Shipments.
Wheat	561,007	525,983
Corn	12,991	.....
Oats	32,934	81,980
Rye	5,078	.....
Barley	50,370	109,439
Flax	139,886	452,310

AROUND THE GREAT LAKES.

Capt. M. W. Humphrey of Detroit has sold the steamer Russell Sage to Carbray & Sons of Quebec.

The schooner Abbie L. Andrews has been sold by John J. Boland & Co. of Buffalo to George B. Taylor of Erie.

The steamer G. J. Grammer struck at Sailor's encampment last week and punctured one of her after compartments on the starboard side.

The steamer Arabian, bound from Montreal to Fort William, with general merchandise, run on a shoal in Lake St. Francis opposite Lancaster, going hard aground.

The steamer Byron Whitaker was sold at United States marshal sale at Detroit last week, bringing $21,000. The steamer was purchased by the Thomas Furnace Co. of Milwaukee and will be operated in the ore trade.

The steamer ordered by W. H. Becker from the American Ship Building Co. last week will be built at the Bay City yard of the American Ship Building Co. and will be named in honor of Alexis W. Thompson.

The Canadian steamer Agawa took cargo of ore to Ashtabula last week. This is the Agawa's first visit to Lake Erie since she was converted into a steamer. She was given both a new stern and bow by the Collingwood Shipbuilding Co. and is now considered to be one of the trimmest lake steamers in the Canadian fleet.

AN IMPORTANT RULING

The Circuit Court of Appeals Holds That the Limited Liability Act Does Not Cover the Liabilities Which Spring From an Owner's Personal Conduct or Stipulations

The United States circuit court of appeals, sixth district, Judges Lurton, Severens and Richards, has just delivered an opinion in the case of the Great Lakes Towing Co. of Cleveland against the Mills Transportation Co. of Port Huron, placing an interpretation upon the limited liability act, which is of great interest to vessel owners and wrecking companies alike. The case has relation to the stranding of the steamer Newago on Devil's Island Shoal, Georgian Bay, on Nov. 17, 1903. The wrecker Favorite belonging to the fleet of the Great Lakes Towing Co. was sent to her relief. On arrival the Favorite found the Newago difficult of access, being in a place of great danger. She stood by, however, and endeavored for several days to rescue the steamer. Her efforts were unsuccessful and the Favorite was finally discharged from further service. The Newago was lost and only about $156 in value of her remnants were saved. The Great Lakes Towing Co. presented a bill of $4,500 for ten days' service. The Mills Transportation Co. contended that it was not personally liable and that recourse was available only against the vessel, of which only the remnants as mentioned remained. Accordingly the Mills Transportation Co. filed a petition for the limitation of its liability. The remnants were appraised and a bond given by the Mills Company in the sum of $250. The Great Lakes Towing Co. filed an answer in opposition to the limitation and asked for a decree for the payment of its bill.

The district court of the United States for the eastern district of Michigan, before which the case was tried, held in favor of the Mills Transportation Co., decreeing that its liability was limited to the remnants of the vessel. It is this decision that the circuit court of appeals has set aside as in error.

By the Act of 1851 (Section 4283 Revised Statutes) it was enacted that:

> The liability of the owner of any vessel, for any embezzlement, loss, or destruction, by any person, of any property, goods, or merchandise, shipped or put on board of such vessel, or for any loss, damage, or injury by collision, or for any act, matter, or thing, lost, damage, or forfeiture, done, occasioned, or incurred, without the privity or knowledge of such owner or owners, shall in no case exceed the amount or value of the interest of such owner in such vessel, and her freight then pending.

And by Section 18 of the Act of June 26, 1884, it was further enacted that:

> The individual liability of a shipowner shall be limited to the proportion of any or all debts and liabilities that his individual share of the vessel bears to the whole; and the aggregate liabilities of all the owners of a vessel on account of the same shall not exceed the value of such vessel and freight pending; Provided, that this provision shall not affect the liability of any owner incurred previous to the passage of this act, nor prevent any claimant from joining all the owners in one action; nor shall the same apply to wages due to persons employed by said ship owners.

The court regards the Act of 1851 as the basic law to which the Act of 1854 is intended to be merely supplementary. The court holds that the Act of 1884 was not intended to have application to liabilities of the owners of vessels for the consequences of their personal faults or of obligations personally contracted by them. Quoting the opinion the court says:

"The purpose of congress was as we think to relieve the shipowner from the consequences of those extraordinary risks which were imposed without limitation by the law of the Admiralty as that law had been interpreted in this country. And by extraordinary risks we mean those risks arising from the conduct of, and contracts made by, those who are beyond the personal supervision and control of the owner and yet have legal authority to bind him to answer for their conduct or contracts or, to express the thought in another way, that the liabilities intended by this legislation were those peculiar to him as a shipowner and had been imputed to him because of his relation to the ship, and not those liabilities, whether for torts or from contracts, which spring from its own personal conduct or stipulations. It seems to us altogether unlikely that congress intended to qualify the power of an owner to make contracts in relation to his ship which by the universal law would be valid if made about anything else and would be enforced in the courts in common law actions. It would be an anomaly that a party competent to do business should be unable to make a valid contract about his own affairs, or be given such an immunity as to make his stipulations of uncertain value. Such a doctrine would be inconvenient in the last degree to the owners of vessels and the interests of commerce. If in every case the party who should undertake to render assistance to other vessels on request of the owner, should be dependent on the proceeds of the vessel for his compensation he would be likely to consider the chances, and the sorer the need of the services the less likely would the owner be to secure them. Instead of relieving him of a burden, he would be burdened with the disability of pledging his personal credit for the securing of the needed assistance. Besides the history of the law upon this subject furnishes an argument in favor of the construction we think should be put upon the statute. It is succintly stated by Mr. Justice Bradley in Butler v. Boston Steamship Co., 130 U. S. 527. From an early period the maritime law of the commercial nations of the Continent of Europe had accorded to the owners of ships this limitation of liability to the value of the ship and freight earned. But this limitation was not allowed when the liability was incurred with the privity or knowledge of the owner. The maritime law of the continent was not accepted by the English courts and was rejected by the courts of this country. The acts of 1851 and 1884 have established in the United States the rules of the general maritime law upon this subject and in almost the identical language in which those rules have been expressed in the codes and textbooks of the countries in which the general law had been embodied. As Mr. Justice Bradley said, in reference to the divergence in this country from the general maritime law, and the return thereto by the enactment of the statutes here for the relief of shipowners, 'We have rectified that.' And we are convinced that the general understanding of the courts of this country is that the statutes here enacted have restored the old rule for the like occasions, namely, when the liability of the owner has occurred without his own participation in the cause or creation of the liability. The suggestion of Mr. Justice Bradley in Butler v. The Boston and Savannah Steamship Co., although not necessary to the decision of that case, seems to have been generally adopted as indicating the proper construction. Indeed prior to that decision, the statutes including that of 1884 had received that construction by Judge Brown in the Southern District of New York in The Amos D. Carver, 35 Fed. 665; Force v. Providence Ins. Co., 35 Fed. 767; and Miller v. O'Brien, 35 Fed. 779. And in later decisions that learned and distinguished judge maintained the doctrine he had previously declared, Laverty v. Clausen, 40 Fed. 542; Gokey v.

Fort, 44 Fed. 364; and Douse v. Sargent, 48 Fed. 695. It was also approved by Judge Nelson in the District of Massachusetts in McPhail v. Williams, 41 Fed. 61 and in Whitcomb v. Emerson, 50 Fed. 128, and by Judge Webb in the District of Maine in The Giles Loring, 48 Fed. 463."

The court is rather curt in its language concerning the further contention that the liability in this case did not arise from any personal contract of the Mills Transportation Co. It says:

"The principle ground on which this contention is urged is that the contract does not mention the company, that on its face it is the contract of Henry McMorran and the Towing Company. That it was made by him in a representative capacity for some one is clear. In respect of the Newago he was managing agent for the Mills Transportation Co. which owned that vessel. And when these facts appear it is evident that he was making the contract for the company. The Mills Transportation Co. being a corporation could act only through some agency. McMorran was the manager and was vested with authority to make such contracts as this in behalf of the owner of the vessel; and the contract was the personal contract of the corporation, not in consequence of any principle peculiar to the maritime law, but by virtue of the common law rules of agency."

Concerning the contention that the contract was made on behalf of the ship and so was not the contract of the owner, the court holds that this contention rests upon an untenable theory, saying:

"The contracts of the manager are the actual contracts of the owner and are not of the same character as the contracts of the master made on a voyage or in foreign ports and which are imputed to the owner from the necessities of commerce. The acts of the managing agent within the sphere of his authority are as much the acts of the owner as if done by the owner himself. Only upon this theory could a corporation make what, for the purpose of making a distinction, is called a personal contract, that is to say, one which the owner himself or itself has made."

The opinion concludes as follows:

"The petition for the limitation of liability in this case misconceived the nature of the liability which the petitioner had incurred and which the towing company was seeking to enforce. The petition after stating the rendering of the services under the contract and the loss of the vessel proceeds to state, as a ground for limitation that the stranding and loss of the vessel 'were not done, occasioned or incurred with the privity or knowledge of your petitioner, or of any of its corporate officers, and your petitioner claims the benefit of the limitation of liability provided by' the statute. And the decree finds that the allegation was true and evidently makes it the basis for according the limitation. But the liability which this towing company was pursuing was not for any fault in the management of the Newago, but for services rendered under a contract with her owner in an endeavor to rescue her from peril and the question whether she was stranded and lost without the privity or knowledge of her owner was wholly immaterial. But the case has been argued as if the case were properly presented, and we have accordingly so dealt with it.

"The decree of the court below which limits the liability of the appellee in respect of the claim of the appellant must to that extent be reversed with costs. The amount due thereon will be ascertained and such further proceedings had as the rules and practice of the court require."

MEAN STAGES OF WATER.

The U. S. Lake Survey reports the stages of the lakes during July as follows:

	Feet above mean tide at New York.		
	This Year.	Last Year.	1895.
Lake Superior	602.75	602.90	602.90
Lake Michigan ...	581.54	581.44	580.07
Lake Huron	581.56	581.45	580.16
Lake Erie	573.31	572.64	571.46
Lake Ontario	247.14	246.76	244.53

The prediction of last month that stages would show a betterment has been verified. All the lakes have made a rise during the month. During August very little change should take place, the present excellent drafts tending to prevail. The lakes are now practically at the crest of the seasonal high water, and balancing these ready for the fall lowering, Lake Superior alone is entitled to a rise of an inch or two more, before it begins to decline.

During the month Lake Superior rose 2½ in. It is still 1¼ in. lower than in July a year ago, 1¼ in. lower than in July, 1895, and 2 in. lower than during the average July for the preceding 10 years. It is, however, higher by 2 in. than in July, 1900.

Lakes Michigan and Huron show a mean rise of 1¼ in. and are 1¼ in. higher than in July last year, 17½ in. higher than in 1895, nearly 6 in. higher than during the average July for the preceding 10 years, and about the same height as in 1905.

Lake Erie rose ½ in. during the month, and has reached a height 8 in. better than in July last year, 20 in. higher than in 1895, 7½ in. higher than the average July in the preceding 10 years, but lower by 1¼ in. than in July, 1904.

Lake Ontario rose ½ in. and shows a stage 4½ in. higher than July last year, 2 ft. 7¼ in. higher than in July, 1895, 9 in. higher than in the average July in the preceding 10 years, but lower by 11 in. than in July, 1904.

DUMP SCOW SUNK IN BUFFALO HARBOR.

The United States lake survey of Detroit is notified by Col. H. M. Adams, United States engineer at Buffalo, that a dump scow has been sunk in the south entrance channel to Buffalo Harbor, and lies 275 ft. northeast of the south entrance gas buoy No. 10. The scow is in 30 ft. of water, has 18 ft. depth over it, and is marked by a red spar. Vessels should pass north of this spar, where the channel is 400 ft. wide and 30 ft. deep. The scow will be removed as soon as the weather permits.

A rock shoal just outside of the north entrance of the harbor is being removed with drill boats and dredges. Vessels entering and leaving by this entrance are warned to take great care in the vicinity of the working plant and pass at a safe distance. The westerly edge of the channel between the breakwater and the shoal is marked by a float showing a white lantern light at night.

NAVIGATING PAST INTERSTATE BRIDGE.

The United States lake survey is informed that complaint has been made by the St. Paul & Western Coal Co., whose dock comes up to the south end of the Interstate bridge at Duluth-Superior harbor, that vessels passing through the temporary opening used by down-bound craft seriously hamper the working of vessels lying at the north end of the dock, causing great strain on the mooring lines, with danger of their parting and resulting in knocking down the derrick booms.

Maj. Graham D. Fitch, the United States engineer, has issued notice that vessels approaching the temporary opening when another vessel is discharging coal at the north end of the dock, shall slow down to four miles an hour (instead of six as prescribed by the

harbor rules), provided conditions of weather and current permit slowing to that speed. This notice does not apply to vessels passing through the draw-span channel used by up-bound boats.

COMMERCE OF SAULT STE. MARIE CANALS.

The statistical report of lake commerce through the canals at Sault Ste. Marie for July show a total commerce of 7,193,236 tons, which is a very creditable showing indeed considering the fact that the ore trade was tied up two weeks by the strike of the ore handlers. The July movement was 1,672,206 tons below that of June, which reached a total of 8,865,442 tons. The total movement to August 1 of the present year is 24,981,555 tons as against 22,610,551 tons last year. Following is the summary of the movement to Aug. 1 of the present year:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

Items—	To Aug. 1, 1907.	To Aug. 1, 1906.	To Aug. 1, 1905.
Coal, anthracite, net tons	632,335	321,857	436,972
Coal, bituminous, net tons	4,880,486	3,248,505	2,513,601
Iron ore, net tons	16,364,443	16,018,806	14,856,053
Wheat, bushels	41,117,902	26,290,985	13,607,165
Flour, barrels	2,314,410	2,230,604	1,640,803

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO AUG. 1 OF EACH YEAR FOR THREE YEARS PAST.

EASTBOUND.

Items—	To Aug. 1, 1907.	To Aug. 1, 1906.	To Aug. 1, 1905.
Copper, net tons	35,291	52,657	45,735
Grain, other than wheat, bushels	20,310,169	22,788,941	10,711,366
Building stone, net tons	100	640	7,038
Flour, barrels	2,314,419	2,230,370	1,633,628
Iron ore, net tons	16,364,443	16,018,806	14,856,053
Iron, pig, net tons	9,271	14,215	31,305
Lumber, M. ft. B. M.	317,826	429,285	424,985
Silver ore, net tons	.....	.....	.....
Wheat, bushels	41,117,902	26,290,985	13,607,165
Unclassified freight, net tons	42,142	74,149	44,758
Passengers, number	15,922	12,456	12,128

WESTBOUND.

Items—	To Aug. 1, 1907.	To Aug. 1, 1906.	To Aug. 1, 1905.
Coal, anthracite, net tons	632,335	321,857	436,972
Coal, bituminous, net tons	4,880,486	3,248,505	2,513,601
Flour, barrels	.....	234	7,175
Grain, bushels	.....	6,749	63
Manufactured iron, net tons	131,210	172,420	52,518
Salt, barrels	194,400	207,673	224,720
Unclassified freight, net tons	402,227	449,050	309,691
Passengers, number	15,814	14,233	13,727

SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Aug. 1, 1907.	To Aug. 1, 1906.	To Aug. 1, 1905.
Eastbound freight of all kinds, net tons	18,906,348	18,386,401	16,490,111
Westbound freight of all kinds, net tons	6,075,207	4,224,150	3,347,093
Total freight, net tons	24,981,555	22,610,551	19,837,204

Total number of passages to Aug. 1, 1907, was 9,165, and the registered tonnage, 18,803,253.

SUBMARINE SIGNALING.

Mr. Charles Moore of the Submarine Signal Co. of Boston called upon Mr. Harry Coulby, president of the Pittsburg Steamship Co. this week and conferred with a number of the captains of the fleet in reference to the workings of the submarine signals. There are several problems still to be worked out in submarine signaling on the lakes when the vessels are in light condition. The forepeak of the lake steamer is practically out of the water when the vessel is light. The receiving apparatus is usually located in the forepeak of the vessel. The condition is one which the experts of the Submarine Signal Co. are attacking and it will undoubtedly be satisfactorily solved in the near future. Mr. Moore has just returned from Detour where a station is now being established and will be in operation by September. Mr. Moore reports that the conditions at this point are conducive to absolutely perfect service for submarine signaling. There will be about 3,500 feet of cable used at this station and the submarine bell will be located in about 50 feet of water. The tripod upon which the bell is suspended was manufactured by the Russel Car & Foundry Co., of Detroit, and was so excellent a bit of workmanship that the Submarine Signal Co. has contracted with the Russel Car & Foundry Co. for all of the tripods that it will use on the lakes.

Submarine signaling is not very old but it has already been placed at every important turning point in the United States and Canada, the Submarine Signal Co. having recently received orders from the Light House Board to equip stations in the Gulf of Mexico. Great Britain has adopted the system in all of its extensive chain of aids to navigation and the company has just received unsolicited a request to equip a Russian cruiser now in German waters with submarine signal apparatus.

GRAND RAPIDS MAY BE A LAKE PORT.

Deep water to the "big lake" is the only adequate means of caring for Grand river flood waters, is the conclusion arrived at by G. W. Bunker, for many years assistant United States engineer, in a report to an association of Grand Rapids manufacturers.

Mr. Bunker's report was sent to the common council and the board of works recently, together with a set of conclusions reached by the manufacturers themselves.

Mr. Bunker has been in active charge of the work done by the government on the river for several years past and probably knows as much about the lower stream as any living man. It has long been his opinion that Grand Rapids should be a lake port, with a harbor depth of 15 or 20 feet and that if the river were dredged to such depths, the greater part of the flood danger would be obviated.

Mr. Bunker's report, on which the manufacturers' suggestions are based, is developed from these three questions asked by them: (a) Is there sufficient data now available for a comprehensive flood protection report? (b) Will the flood protection work now under way and contemplated work in well with an adequate flood protection plan? (c) Is it feasible to get relief from floods by deepening the river to the lake?

Mr. Bunker's answers may be summarized as "no" to the first question and "yes" to the second.

By far the greater part of his report is devoted to discussing the third question. His conclusion is that it is most desirable, from the standpoint of navigation and flood protection, that Grand Rapids should be made a lake port.

As to the necessity for more data, he says: "No business firm would enter into so large an expenditure (a million dollars) without the most exhaustive investigation as to the feasibility of the scheme and the ultimate financial or economic returns."

Mr. Bunker then elaborates his idea that deep water would take care of the floods. By cutting down the river bed he figures that the high water slope could be reached from 27 feet in the 40 miles which obtained during the big flood of 1904 to a slope of 18 ft. to the 40 miles. If the slope of 18 ft. were obtained the high water below the dam would be cut to between 10 and 11 ft., or not

enough to back water into the Canal street basements.

This conclusion being reached, Mr. Bunker goes on to estimate what would be necessary to bring it about.

He comes to the conclusion that a 21 ft. channel with a width of 400 ft. would involve the moving of between 30,000,000 and 40,000,000 cubic yards of dirt, and estimates the cost to be between $3,000,000 and $4,000,000.

Mr. Bunker then shows that with proper handling the goverment could be induced to bear a share and probably the greater burden of the first cost and would stand practically all of the maintenance expense. Summing up his argument for deep water he says:

"It is perfectly feasible to get relief from extreme flood conditions through the improvement of the river from Grand Rapids to Lake Michigan.

"It is the only plan which promises absolute safety from extreme floods to all sections of the city.

"It brings deep water navigation to the heart of the city."

CORRECTION.

Capt. F. C. Watson, of the steamer Van Hise, has called our attention to a glaring error in the article entitled "A Few Hints for the Young Man Aboard Ship," published in the July 25 issue. "Starboard helm, green light and one whistle, are practically all one and the same thing," should read *"Starboard helm, green light and two whistles are practically all one and the same thing."* The types made it one blast instead of two blasts. Likewise, "port helm, red light and two blasts" should have read *"Port helm, red light and one blast* are practically all one and the same thing." This is very important and a mistake of this kind is a bad one if it were left uncorrected. The MARINE REVIEW will always be glad to have its attention called to errors of this kind.

PERSONAL AND NAUTICAL.

Capt. Frank Burke, master of the steamer Midland Prince; and Capt. W. C. Jordan, master of the steamer Agawa, were among MARINE REVIEW nautical visitors on Monday while their respective ships were in port taking on and discharging cargo. Captains Jordan and Burke are two of Canada's up-to-date commanders who believe in assimilating science with the practice of their profession. The Midland Prince is the new steamer built at Collingwood for the Midland Navigation Co., of Midland, Ont. The Agawa was formerly a sailing vessel, and was last winter converted into steam power. She is owned and operated by the Algoma Central Steamship line. This was Capt. Jordan's first trip down with the Agawa, with ore from Michipicoten Harbor to Ashtabula. She loaded coal at Cleveland.

ANSWERS TO QUESTIONS FOR WHEELSMEN AND WATCHMEN.

NINTH INSTALLMENT. PUBLISHED JULY 18.

97. A steamer underway in a fog or thick weather.

98. A sailing vessel running free in thick weather.

99. One long blast of the whistle. Consult Rule IV of Pilot Rules.

100. One long blast. See the same rule as above.

101. Several (five or more) short and rapid blasts of the steam whistle.

102. Consult Rule III of Pilot Rules for answer.

103. One blast. (Port helm.) The vessel astern takes the starboard hand side, but leaves the other one on her port side in passing. See Rule VI.

102. Answers with one blast if she deems it safe. If not, blows an alarm signal. Consult Rule VI.

103. Blows an alarm signal (five or more short and rapid blasts).

104. Two blasts.

105. Goes to port.

106. Goes to port.

QUESTIONS FOR WHEELSMEN AND WATCHMEN.

TWELFTH INSTALLMENT.

131. In passing through narrow channels where there is a current, which steamer has the right of way, the one going up or the one coming down?

132. In passing through narrow channels where there is no current, which side should they pass each other on?

133. What is meant by gross tonnage?

134. What is meant by net tonnage?

135. What tonnage is meant when mentioned in these rules?

136. What is meant by registered length?

137. What is meant by overall length?

138. How many three-point courses are there?

139. What point course is NE x N?

140. How many points is it from E x S to S x E?

141. How many fog blasts does a sailing vessel sound when she is on the port tack with the wind for'ard of abeam?

142. At anchor, what time would you hang out your riding or anchor light?

ITEMS OF GENERAL INTEREST.

The steamer Tuscarora, which is undergoing repairs at the Escorse yard of the Great Lakes Engineering Works, will be ready for service on Monday. The Tuscarora was damaged in collision with the Maryland at Port Huron.

The old schooner Montpelier, in tow of the steamer Rand, carrying a cargo of slack coal from Cleveland to Port Huron, sank in the Detroit river near Belle Isle this week. The crew got off safely.

The barge Golden Age, upbound in tow of the steamer William Edwards, ran into the east bank at the Lime Kilns crossing last Sunday. She was released by the wrecker Newman after 150 tons of cargo had been removed.

The United States steamer Australia, which formed one of the Spanish fleet captured by Commodore Dewey in the Philippines, has been transferred from Portsmouth navy yard to Detroit, where it will be stationed as a naval reserve ship.

The tug Abbott of the Great Lakes Towing Co.'s fleet, which was being repaired at the company's Cleveland yard, was damaged by fire on Tuesday night. It is charged that one of the boilermakers left a lamp burning over night.

Frederick M. Williams, August Richter and Clarence Young have been appointed by the board of public works of Milwaukee to appraise the property which it is property to condemn in order to straighten out Kinnickinnic channel for the purpose of making a turning basin.

The steamer Cyprus, building for the Lackawanna Steamship Co. will be launched from the Lorain yard of the American Ship Building Co. on Saturday next. The steamer Salt Lake City, building for W. A. and A. H. Hawgood at the South Chicago yard of the American Ship Building Co., will be launched Aug. 29.

Maj. Charles Keller, United States lighthouse engineer at Detroit, has received a report from Walter F. Beyer, assistant in charge of the work of constructing the new Rock of Ages lighthouse at Superior, which indicated that rapid progress is being made upon the work. The lower half of the steel casing is in place, and workmen have begun to put in the concrete filling. Should weather favor it is expected that the concrete will be sufficiently advanced by the end of the month to be undamageable by the elements.

FURTHER RESULTS OF SUBMARINE SIGNALLING BY MEANS OF SOUND*

BY J. B. MILLET, ESQ., ASSOCIATE.

One of the earliest instincts of the human race is for men to communicate with each other by means of sound. The air is a very fair conductor of sound, and the ordinary velocity is about 1100 ft. per second. Water, however, as a conductor of sound is infinitely better in two respects: first, the velocity is about 4700 ft. per second, or a little more than four times as fast, and secondly, sound is not subject in water to certain obscure causes of disturbance as it is in air. A remarkable illustration of this fact recently came to my notice. A party of observers set out to test the sound range of a siren on a lightship. All the conditions were favorable—a calm sea and clear, still air. The boat approached nearer and nearer the lightship, but not a sound reached the ears of the listening experts. Suddenly at a distance of 600 yards, without the slightest warning, these gentlemen were all but deafened by a sudden roar from the siren, which continued until they boarded the lightship. On inquiry it was found that the instrument had been sounding at its full pitch at frequent intervals for over three hours. Other illustrations of the unreliability of sound signals in the air under certain conditions were given in the discussion following the paper I read before this Institution in 1905. I do not suggest for one moment that sound signals in the air should be superseded, but desire to emphasize the fact that, from the nature of the case, greater confidence may be placed in sound signals made in the water, both as aids to navigation, and as a means of communication between ships.

The idea of using water as a medium for carrying warning signals to ships is not a new one. In 1887 patents were granted to two Americans for submarine signalling apparatus, and in the following year the system which is now used on all the great Transatlantic liners was closely described in the patent applications of Messrs. Neale and Smallpage, two Englishmen. Unfortunately, their apparatus was inoperative, and the means at their disposal did not enable them to study the peculiarities of sound in water (and on the ships it reaches) sufficiently to secure a practical result. In the first place, it is necessary to get a clear understanding as to the aim and object to be attained. The instruments used, to be practical, must enable those on board in charge of a moving vessel to hear sounds in the water, and to utilize them as warnings or signals. Unless the direction of the source of such signals can be located accurately and quickly, under varying conditions of weather, and without stopping the steamer, they cannot be considered practical. During the last twenty years many attempts have been made to solve this problem, and excellent work has been done by individuals. Prof. L. J. Blake, working in connection with the Light House Board of the United States, has been a prominent worker in this field; but the system of signalling described in this paper owes its initiation to Mr. A. J. Moody, of Boston, U. S. A. Mr. Moody was unaware of the work done by his predecessors when he became interested in the subject in 1900; but with the help of assistance he laid the foundation of the system which we have developed, by applying existing knowledge of the principles governing sound in water and making it possible to strike a note on a bell under water at regular intervals, and to enable the navigator of a ship to receive these sounds without leaving his wheel-house. A large body of experience gained in the last three or four years, proves that this new aid to navigation will be the means of saving many lives and much property.

The difficulties to be overcome in reaching this result have been very great, as little was known of the subject. It may be convenient to repeat a few details of our experience given in my former paper. The first bells used weighed 1000 pounds, and were cast for church steeples. After many experiments under difficult conditions and facing risks inevitably attending experiments made in the open sea, it was discovered that the higher tones of these bells which were weak in the air were the notes possessing the most penetrating qualities in the water. Bells were, therefore, cast with less than one-half of the diameter first employed, and with a thick lip; these were found to produce a high, clear note of rather higher pitch than the middle C, and they weighed only 150 pounds. In this manner the problem of designing a practical submarine bell-buoy has been greatly simplified.

There are now three main systems of using bells under water:—(1) Bells suspended over the side of the vessel and lowered about 25 ft. below the surface of the water; the blows are produced by the action of compressed air; and are controlled by a code-ringing device in the engine-room, so that each lightship rings its own number; (2) Bells supported on tripods placed on the floor of the sea, and operated by electricity sent along a cable from a power house on shore; (3) Buoys supporting submarine bells some 25 ft. below the surface. Above each bell is a disc working on the principle of a sea anchor; the difference in movement between this disc and the buoy operates a delicate but reliable mechanism, and with waves only 6 in. in height two blows a minute can be struck.

The character of the sound produced in water is of the greatest importance. When it reaches the ship it must have qualities that distinguish it unmistakably from any other sound; that is to say, it must be musical, and the vibration must have such an appreciable duration that the sound could not be confused with noises within the ship produced by pumps, or other auxiliary machinery. A bell of some sort rung under the water was, obviously, the simplest and most practical form to try first; and those workers who have perfected the system began with bells, and have never abandoned them. In the course of the experiments, however, trials have been made with many ingenious devices, such as reeds vibrated by an impinging stream of water, or other similar devices. The early experiments were very difficult to conduct, since all the work had to be done under water, and the results were misleading and discouraging, first, because there were no precedents to fall back upon, and, secondly, because the microphone had not been perfected. A large number of the trials proved failures, because the microphones were unsatisfactory, although they were thought, at the time, to be due to imperfect bells. It will be seen therefore, that an invention which has to be perfected under such circumstances, by weighing one result against another, without accurate knowledge of conditions, called for great devotion to the cause both on the part of those who were doing the work and those who supplied the funds for a very large expenditure on the research.

Experiments have proved that the

*Read at the Bordeaux International Congress, by Sir William White in the absence of Millet.

bell can be distinctly heard on board ship, on a vessel travelling at high speed, twelve to fifteen miles from the source of sound. There has been no proved failure of the system, although some persons have expressed doubts. Strange things have happened in the trials. One experimenter was dissatisfied because he could not hear the bell at a moderate distance, when other observers heard at greater distances. This disturbed us momentarily, but it was soon shown to have no bearing on the future of the invention, as the gentleman complaining was discovered to be very deaf.

In order to understand how these signals are made available, we must first conceive a bell rung about 20 ft. or 25 ft. below the surface of the water. The notes do not lose their musical tone, and the interval between successive notes is regular, if the bell is properly made and operated. The sounds are so much like the sound of a bell in the air that they can be immediately recognized. A novice in the wheel-house of a ship fitted with the receivers and indicator box is immediately able to determine the position of the bell within one-quarter of a point. This has been actually done at a distance of from 12 to 14 miles from a lightship. One master writes from the S. S. Arranmore, of Boston, on 23rd March, 1906: "My wife used the apparatus during a part of the time, and, although she had never seen it before, had no difficulty in getting the direction as well as I could myself." Indeed, a ship floating in the water is a most excellent collector of sounds submarine. The bell notes readily penetrate the hull, and may often be heard by an observer standing in the hold. By placing one's ear against the skin of the ship, the notes may be distinguished at long distances when the ship is quiet. It is, however, infinitely more advantageous to eliminate the possibility of human error and to bring the sound of the bell up into the wheel-house. The noises of the ship, especially in steamships, interfere with the bell-note, and the direction of the source of sound cannot be ascertained except in a general way, unless an indicator box is fixed in some convenient position for the captain or pilot.

The perfecting of the receiving apparatus was a very important factor in the system of submarine signals. In the first experiments, a tank was let over the side of the ship, but this plan was naturally found impracticable for vessels travelling at a high speed. It was said that it would be absolutely impossible to have the tank on board, owing to the noises on a ship, and that it would be impossible to distinguish the bell from the riveter's or a carpenter's hammer. Nevertheless, a practical solution has been found in using the ship itself as a sound collector, and in securing the tanks to the skin of the ship, and the success of the system has thus been assured.

The steps that led up to the present form of apparatus have been described in my earlier paper (of 1905); suffice it to say that the apparatus for receiving the sound now consists of two metal tanks about 22 in. square filled with sea water, fastened securely against the inside skin of the ship below the water-line, and placed at a certain demonstrated distance from the fore-foot, varying according to the shape of each individual ship. A specially-designed microphone is suspended, wholly immersed, in each tank; and wires connect this microphone with an indicator box on the bridge, pilot-house, or elsewhere. This box is of metal, circular in shape, and is fitted with two telephonic earpieces or receivers, enabling two observers to listen simultaneously. By the simple process of moving a switch the listener can locate the bell as being either on his port or starboard hand. As a provision against accident, a second set of microphones is placed in each tank, and by manipulating another switch on the indicator box the operator is enabled to connect either set at will. This short description of the invention indicates the simplicity of the instruments as at present devised.

The principle as an aid to navigation has been thoroughly tested on the steamers of the great Transatlantic lines, and the reports have been uniformly satisfactory. Such confidence has been established that navigating officers on these lines are now instructed to alter their course, if need be, in obedience to the submarine signals they receive from the lightships or bell buoys in a fog or thick weather. Considering the conservatism of sea captains and their natural unwillingness to adopt anything so revolutionary as this invention, it seems remarkable that so much progress has been made, and I can only account for it by the fact that the instinct to communicate by sound is so inbred in them that they naturally fall back upon it when anxious for the safety of their ships, when approaching a coast in fog. As a matter of fact, they are now certain, after continued trials, that they can rely absolutely on the signals they get through the water.

To arrive at a proper appreciation of the value of submarine signaling, I must again remark that signals in the air are subject to the interference which wind, fog, and storm bring with them. Frequently the most efficient sirens known to the lighthouse services of Europe are rendered useless by the violence of the wind, which carries the sound with it. The recent loss of the Suevic reminded the world of this fact, and of the untrustworthiness of air signals. A heavy gale blowing from the ship to the shore prevented the note of the siren from reaching the ship, where, no doubt, eager ears were listening for it in vain. Seamen who are familiar with the use of sound signals, agree that they are not a safe guide to rely on solely, and it is the experience of scientists like Tyndall and others that they must always remain so. Water, on the other hand, as a medium for carrying sound, is not affected by wind or storm; it transmits the sound waves in all directions at a speed four times greater than the air; it is not affected by tides or currents, owing to the fact of the rapidity with which the sound travels. There is another all-important fact for purposes of signaling between ship and ship:—as air is much lighter than water, the sound passes reluctantly from water into air; and, therefore, sound signals remain in the water and cannot be confused with any other sounds. There is, therefore, little or no risk of any ship in a fleet not receiving orders from the flagship simultaneously with other ships. The chances are small of a foreign fleet, either equipped or unequipped with signaling apparatus, "tapping" the instructions from an Admiral to his fleet, if the code used, as is already done with flag codes, is communicated only to his own fleet. Of course, fog does not intercept the giving and receiving of signals. Nor are they as evident as light signals.

It may be of interest to recapitulate briefly what has been already done in the way of fitting ships and lighthouses. Taking my own country (the United States) first, we have signals fitted on lightships from almost the most northerly point, that is to say, Portland, in Maine, continuously down the east coast past Cape Hatteras to Savannah, making a total of thirty-four lightships and three bell-buoys. Where necessary there are two or three continuous stations, which tap out their

warnings to vessels as they approach the ports. At New York, for example, a vessel coming from the east picks up the Nantucket shoal; soon after she has passed it she will hear the Fire Island warning, and before she has dropped that she will catch the warning notes from Sandy Hook, which will guide her right up to the Sandy Hook bell-buoy. Vessels fitted with a receiving apparatus have been known to go straight into New York in a thick fog, whereas other vessels have had to lie to at an enormous expense of coal and loss of time. Canada is launching out, and has already five lightships and one shore station, and there is every chance, now that they have started the use of bells, that navigation will insist on the number being increased. In Europe the most go-ahead country in this respect is Germany. Here already the Kiel, Weser, Elbe, and six other lightships are either in operation or being fitted. In France two experimental stations for submarine signals have proved the utility at Boulogne and Cherbourg. There are also two in Denmark. In England, perhaps owing to her ancient institutions, only one such station has so far been established, on the North West Lightship at Liverpool, but the necessity for increasing the stations is generally recognized. Of the ships that have been fitted with receiving apparatus, the principle lines using the system are:

North-German Lloyd, 13 ships; Hamburg-American, 12 ships; Holland-America, 5 ships; Cunard Line, 8 ships; Canadian Pacific, 13 ships; French Line, 3 ships; White Star, 13 ships; Pittsburg S. S. Co., 12 ships; Metropolitan-New York, 6 ships; Boston-Philadelphia, 4 ships; American Line, 4 ships.

A total tonnage of 1,341,210 of shipping now has receiving apparatus fitted. The English government, and the German and French governments have approved and adopted the system for various classes of vessels, including submarines, pilot boats, and steam yachts. H. M. King Edward's yacht Victoria and Albert and H. M. the Emperor William's Hohenzollern are in this list. There is no doubt that the results obtained by vessels demonstrate the extreme utility of the submarine bell as an adjunct to coastal navigation in thick weather. To quote the words of the report made by a committee of officers of the royal navy to the British admiralty. "The fog signals at present in use cannot be depended on to be heard under all conditions, even at two miles' distance, and a vessel failing to make out a fog signal may be on a safe course, and in her estimated positon, yet she must stop or anchor or alter her course because she is uncertain. The submarine bell increases the range at which the fog signal can be heard by a vessel until it approximates to the range of a light vessel's light in clear weather; and, moreover, its bearings can be determined with quite sufficient accuracy for safe navigation in fog from distances far beyond the reach of aerial fog signals if the vessel is equipped with receivers. To double or treble the distance at which fog signals can be heard is a great advantage to shipping, and the facility of determining the direction of sound signaling is in itself a very valuable discovery. The installation of submarine bells in light vessels must come sooner or later, as is proved by the rapid extension any nation has given it who has adopted this system in one or two light vessels. Those who wait longest will incur the greatest loss in the meantime, both in ships and lives and through delays to shipping, which would otherwise be avoided."

A few practical illustrations of the use of our system of signaling may be of interest. The following quotation is made from a letter written by the master of the Kaiser Wilhelm II, of the Norddeutscher Lloyd Line: "On the entrance of the Kaiser Wilhelm II today into the Weser, the submarine bell on the Outer Weser lightship was heard with the starboard receiver one point to starboard at a distance of about 10 knots. There was a thick fog, with light S. W. wind and calm sea. The course was changed one point to starboard, whereupon the bell, after this change of course, was heard only with the port receiver, so that it was evident the lightship must be located about one point ahead as a result of this change of course which was proven later to be correct. The fog signal of the lightship was heard 13 minutes later than this, and in the same direction from which we had already received the bell signal. We sighted the lightship about 3:19 p. m., and passed the same about 3:25 p. m. close by, on the port side. Shortly after the first location of the submarine signal we passed three ships which were not equipped with the submarine signal apparatus, and which were still seeking to find the Weser Lightship. The certain location of the position at a distance of about 10 knots, in a heavy fog, again proves the extraordinary usefulness of the invention for the safety of navigation in all kinds of bad weather."

On another occasion, a German passenger steamer, approaching the Weser, ran into fog. As no bell was heard from the outer light-ship, a message was sent by wireless telegraphy, asking that the bell might be set ringing. At the light-ship there was no sensible fog and the bell had been silent. When it was rung the steamer heard it at once, and shaped her course with certainty.

At Cherbourg the steam-tender to the German liners calling there has been fitted with a bell, hung in a compartment flooded with sea-water. When fog prevails, she proceeds outside to meet incoming steamers, rings the bell, and is heard on board the steamers, which thus determine their position and find their way into port.

These few examples, out of many that might be given, bring home the value of the system to those who have not had practical experience of its working. I would most seriously recommend anyone interested in practical navigation not to be satisfied with the few words I have been able to give you today, but to arrange to test the apparatus himself. There is nothing which brings home the utility of an appliance like practical experience. Submarine signals will, undoubtedly, prove to the seaman an aid such as he has never had before in navigating in a fog; it will also prove a source of economy to ship owners by effecting savings in time, coal, and working expenses. Shipping companies in these days cannot afford to neglect any opportunity of utilizing labor-saving and economizing apparatus. Nor can any government authority afford to neglect a safeguard to navigation. Pressure brought by the leaders of the shipping world upon their respective governments, will eventually lead to the establishment of submarine bells on lightships, and at lighthouses and stations. I look forward to the day when all the principal ports along dangerous coasts will ring out their warnings to vessels that they are approaching dangerous spots; when every vessel of a reasonable size will be fitted not only with receivers, but possibly also with bells of their own, so that one ship will be able to locate another in a fog, and that each will be able to locate its exact position with respect to fixed points; when ships will be able to enter ports without the risk of the calamities of which the papers report several each stormy and foggy day; when loss of life would be minimized and fewer vessels sunk through ram-

ming each other in a fog. If these results are attained, we shall feel that we have been instrumental in leaving navigation a good deal safer than we found it.

COST OF DRILLING AND BLASTING SOFT SHALE ROCK UNDER WATER, USING DRILL BOATS AT ASHTABULA HARBOR, OHIO.

The following costs of drilling and blasting shale rock under water at Ashtabula Harbor, Ohio, have been furnished by Mr. E. C. Brown Jr., Assistant Engineer, Lake Shore & Michigan Southern railway. The work recorded in subaqueous excavation, the finished grade being about 21 ft. below lake level. After drilling and blasting, the excavation is carried on with dipper dredges. This work is being done to provide new channels and slips for the new ore docks of the Lake Shore & Michigan Southern Railway Co. at Ashtabula Harbor.

The drill boats are about 85 ft. long by 30 ft. wide and are held in position by four spuds, one at each corner. They are equipped with Ingersoll-Sargent steam drills supported upon vertical frames having trucks to permit of the drills being moved horizontally along the edge of the boat. The drills are raised and lowered during the operations of the drill by hydraulic lifts. The boilers furnish steam for operating the drills, the pumps connected with the hydraulic lifts and the electric lighting plant and other machinery.

Drill boat "A" is equipped with three drills and drill boat "B" with two. The amount of explosive used is about ¾ lb. of 45 per cent dynamite per lineal foot of drilled hole. A hole is charged by inserting sticks of dynamite, with the exploders and battery wires attached, into the bottom of a long pipe, the battery wires leading out through a slit in the side of the pipe. This pipe is lowered into the drilled hole, the dynamite shoved down with a ramrod, and the pipe withdrawn, a wire spring clamped to the dynamite preventing its coming out of the hole. The wires are then attached to the battery and the dynamite is exploded. The operation of the other drills is not interrupted during the time of firing. About ½ lb. of 45 per cent dynamite is used per cubic yard of blasted material, place measure. In this class of excavation it is not necessary to drill the holes more than from six inches to one foot below grade.

Referring to the performances of the drill boat "B" it will be noticed that the cost of drilling and blasting at night was much less than by day. This is due to the fact that the work is done in the open lake wthout protection from wave action and still weather prevails more often at night, making the operation of the boat less difficult. During the day, a day breeze often springs up as the sun comes up and goes down as the sun sets. Oftentimes this breeze is fresh enough to stop operations.

WORK WITH DRILL BOAT "A."

Drill boat "A" worked days only. The average depth of holes was 6.15 feet and their average distance apart was 6.7 feet. The wages paid labor and the prices of materials were as follows, a 11-hour day being worked:

Foreman	$4.85
Drillers	3.30
Helpers	2.42
Fireman	2.20
Blacksmith	3.00
Blacksmith's helper	2.20
Coal, per ton	2.70
Dynamite, 45 per cent, per lb.	.15
Electric detonators, per dozen	.30
Tug service per transfer	5.00

The following is the record of work for the month of May, 1907:

ROCK DRILLED AND BLASTED 4,744 CU. YDS. PLACE MEASURE.

	Total.	Per cu. yd.
2,134 lbs. of explosives at 15 cts.	$ 320.10	$0.067
30 transfers at $5 by tugs.	150.10	.032
33 tons coal at $2.70	89.10	.019
Labor, drilling and blasting.	320.10	.067
Lay time, due to bad weather and breakdowns	107.68	.022
Repairs	147.04	.032
Miscellaneous	14.24	.003
Electric detonators	23.20	.005
Interest and depreciation...	180.00	.038
4,744 cu. yds. drilling and blasting at 28.5 cts.	$1,351.46	$0.285

The drilling was done with 3¼ to 4-in. drills, the total depth of hole drilled being 2,853 feet. The total amount of explosive used was 2,134 lbs., or 0.75 lb. per lineal foot of hole. The number of drills sharpened was 38, so that one drill was sharpened for each 75 lineal feet of hole drilled.

WORK WITH DRILL BOAT "B."

Drill boat "B" was worked day and night shifts. On the day shifts the average depth of holes was 9.1 feet and the average distance between holes was 6.6 feet. On the night shift the corresponding figures were 9.5 feet and 6.6 feet. The records of cost for the day shifts and the night shifts for the month of May, 1907, are given separately.

RECORD OF DAY SHIFTS.

ROCK DRILLED AND BLASTED 6,460 CU. YDS. PLACE MEASURE.

	Total.	Per cu. yd.
3,219 lbs. of explosives at 15 cents	$ 482.85	$0.075
7 transfers by tugs at $5..	35.00	.005
41 tons coal at $2.70	110.70	.017
Labor, drilling and blasting	451.03	.071
Lay time due to bad weather and breakdowns	168.30	.026
Repairs	105.20	.016
Miscellaneous	4.80	.000
Electric detonators	22.00	.003
Interest and depreciation on plant	150.00	.023
6,460 cu. yds. drilling and blasting at 23.6 cts.	$1,529.88	$0.236

The drilling was done with 3¼-inch drills, the total depth of the hole drilled being 4,004 feet. The total amount of explosive used was 3,219 lbs., or 0.804 lb. per lineal foot of hole. The number of drills sharpened was 68, so that one drill was sharpened for each 59 feet of hole drilled.

RECORD OF NIGHT SHIFTS.

ROCK DRILLED AND BLASTED 6,805 CU. YDS. PLACE MEASURE.

	Total.	Per cu. yd.
3,148 lbs. explosives at 15 cts.	$ 472.20	$0.070
7 transfers by tugs at $5..	35.00	.005
39 tons coal at $2.70	105.30	.015
Labor, drilling and blasting	370.48	.054
Lay time due to bad weather and breakdowns	193.52	.029
Repairs	38.18	.006
Electric detonators	22.20	.003
Interest and depreciations on plant	150.00	.022
6,805 cu. yds. drilling and blasting at 20.4 cts.	$1,386.88	$0.204

The drilling was done with 3¼-in. drills, the total depth of hole drilled being 4,218 feet. The total amount of explosive used was 3,148 lbs., or 0.75 lb. per lineal feet of hole.—*Engineering-Contracting.*

BIG ELECTRIC PLANT AT ERIE.

Negotiations have been completed, it is announced, whereby the General Electric Co. will establish an extensive plant at Erie, Pa. Plans are not yet complete, but it is understood they will call for the erection of two main buildings, each 175 x 800 feet, with the usual auxiliary buildings. Work on the new plant will be begun as soon as railway connections can be established. It was stated some months ago that this company would locate large works in Erie, but this was later denied. It now transpires that the project was blocked temporarily by differences betwen this interest and the Erie Terminal Railway Co. These, however, have been cleared away and work will proceed.

Vessel owners were gratified to learn of an improvement this week in the condition of Capt. J. L. Weeks, fleet captain of the Gilchrist Transportation Co., who has been quite ill with typhoid fever.

The steamer Calumet, building at the Wyandotte plant of the American Shipbuilding Co. for the Lackawanna Steamship Co., was launched on Saturday noon last and was christened by Miss Jane Atterbury of Detroit. The Calumet is the third of a fleet of eight building for the Lackawanna Steamship Co. to be launched. The Calumet is 440 feet over all, 420 feet keel, 52 feet beam and 28 feet deep. She will be commanded by Capt. Harry Howard of Bay City, Mich. Her engineer will be Frank Steadley of Detroit.

THE KHEDIVE'S YACHT MAHROUSSA.

An interesting piece of work has recently been completed by Messrs. A. and J. Inglis, Pointhouse, Glasgow, in the reconstruction of the Khedivial yacht Mahroussa, the work including the fitting of new boilers and turbine machinery in place of the original oscillating engines, the removal of the side paddle-wheels, and the reconstruction of the stern to suit triple-screw propulsion. The result has been most satisfactory, and the Khedive has himself paid a well-deserved compliment to the firm of Messrs. A. and J. Inglis. The Mahroussa was originally built forty-one years ago by Messrs. Samuda Brothers, for Ismail Pacha, and was probably at that date the largest and most magnificent vessel of the kind in existence. Built with the best materials procurable, and with workmanship of the highest class, she was found on inspection after forty years' service to be much too good for the scrap heap, and sufficiently sound to be worth a complete refit. Sea-going paddle-steamers, and low-pressure boilers with simple engines, are now, however, completely out of date, and the preservation of Penn's oscillating engines was not to be thought of. His Highness the Khedive of Egypt, being thoroughly well informed of what is going on in Western Europe, at first determined to have the Mahroussa transformed into a twin-screw steamer, and later, realizing the progress of the turbine, resolved to avail himself of the new motor. Messrs. A. and J. Inglis, Limited, of Pointhouse, Glasgow, had built for His Highness the 700-ton yacht Safa-el-bahr, which gave him the greatest satisfaction, and earned for Dr. Inglis the decoration of Commander of the Imperial Order of the Osmanieh, and as a consequence of the success of this yacht, they were asked to submit plans and estimates for the work to be carried out on the Mahroussa to Sir Vincent Corbett, K. C. V. O., the Financial Adviser to the Khedive, who called to his assistance Prof. Biles, of Glasgow University, and, after some negotiations, the plans on which the alterations have been carried out were arranged.

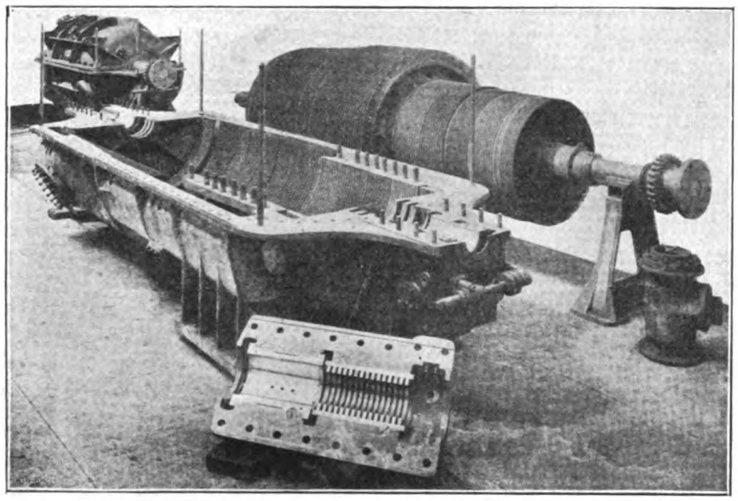


FIG. 1.—VIEW OF HIGH-PRESSURE AND ONE LOW-PRESSURE TURBINE.

The chief constructional work, so far as the hull was concerned, was associated with the adaptation of the stern to the triple-screw arrangement. This had to be carried out in a graving dock, and practically the only docks available for Messrs. Inglis were those of the Clyde Navigation Trust at Salterscroft. The trustees occasionally show some hesitation in granting the use of these docks for any lengthened period, as they are constantly in demand for cleaning and painting operations and urgent repairs to vessels frequenting the ports. It happened that an Allan liner, which had sustained serious damage, required a dock concurrently with the Mahroussa, and Messrs. Inglis were therefore urged to make their occupancy of the dock as brief as possible. To meet the Clyde Trust condition, Messrs. Inglis devised special methods, so that the yacht would occupy the dock for the minimum of time. Moulds were made of the frames while the vessel was afloat, and as much of the after-body as had to be reconstructed was laid down full size in the mould-loft. From this draft the new stern-frame, keel-piece, balanced rudder, bossed frames, etc., were completed, ready to be erected as soon as the vessel was docked and the old stern cut away to receive the new. Every single piece of the new construction was found to fit so accurately that when the job was completed there was nothing to show that the vessel had not been originally built as a triple-screw steamer. The engines and boilers had meanwhile been removed, the paddle-boxes taken down, and the poop and deck-houses, as well as most of the decks, removed, bulkheads shifted, bunkers re-arranged, and new engine and boiler-seats fitted. Steel decks were laid for about half the length of the ship. A range of deck-houses, framed in steel and lined with polished teak, was erected on the upper deck, which was relaid with teak.

The whole of the internal arrangements have been reconstructed. The decorative work in the principal apartments was carried out by Messrs. Waring & Gillow, of London, and Messrs. Wylie & Lochhead, of Glasgow. The new machinery, including the turbines, was constructed by Messrs. A. and J. Inglis, of Glasgow. It is the first work of the kind undertaken by the firm, and the success attained on the trial, on the voyage to Alexandria, and on subsequent steaming, shows that this, one of the oldest of our engineering firms, still maintains its place amongst the most progressive. There were in the old ship eight boilers of the square-box type, the

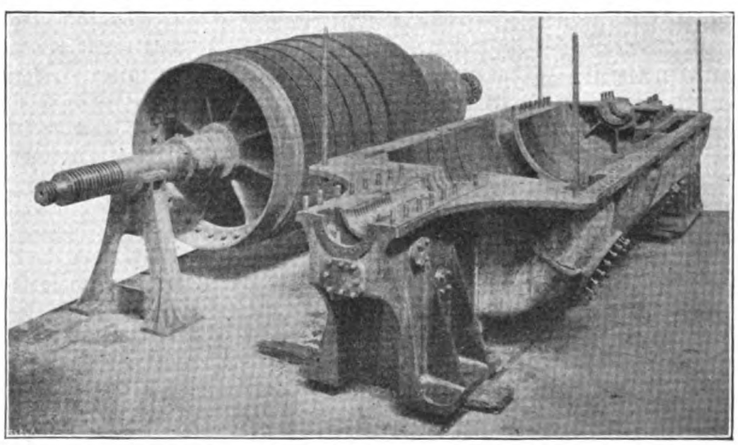


FIG. 2.—LOW-PRESSURE TURBINE CASING AND ROTOR.

length being 15 ft. 7 in. and the width 10 ft. 1 in. These had each four furnaces, making thirty-two in all, the length of the fire-box being 7 ft. 6 in. and the width 3 ft. 4 in. In all there were 3,696 tubes, of an external diameter of 3 in., and having a length of 6 ft. 6 in., so that the total heating surface was 18,860 sq. ft. The boilers were designed to work at a pressure of 15 lbs. The new boilers, on the other hand, are five in number, of the cylindrical type, the length being 11 ft. 4¼ in. and the diameter 14 ft. 3 in. In each boiler there are three furnaces, having an inside diameter of 3 ft. 4 in., with a length of fire-bar of 7 ft. 6 in., giving a grate area of 300 sq. ft. The total number of tubes is 1,400, and they are 3 in. in external diameter and 7 ft. 3¼ in. long, so that the total heating surface is 10,170 sq. ft. The working steam pressure of these boilers is 160 lbs.

As is now usual in moderate power installations, there are three turbines, the high-pressure turbine being mounted on the center shaft, with a low-pressure turbine on each wing shaft; each shaft has one propeller. The astern turbines are incorporated in the same casings as the low-pressure ahead turbines. The outside diameter of the high-pressure turbine casing is 5 ft. 6 in., and of the low-pressure casing 6 ft. 11 in. The blades are fixed on the principle adopted by Messrs. Parsons.

In Fig. 1 the high-pressure turbine is shown in the distance. This view shows also the low-pressure casing with the astern turbine end in the fore-front, and on the floor is the upper part of the thrust-block.

Fig. 2 shows the low-pressure turbine casing and rotor from the forward or ahead end, with the thrust-shaft and thrust-shaft bearings in the fore front. The astern turbines, it may be mentioned, are of unusual length, which should greatly increase the stopping and manoeuvring power of the ship.

The speed desired with four-fifths of the boiler power was 16 knots, and this was exceeded on a trial of six hours' duration on the Clyde. When working at full power the mean of four runs over the measured mile at Skelmorlie was 17¾ knots, the engines running at 456 revolutions, and developing 5,000 shaft horsepower.

The yacht is now 400 ft. long, 42 ft. beam, and of 28 ft. 2 in. moulded depth. On a draught of 17 ft. 2 in. the displacement is 4,300 tons. The vessel now has a very much smarter appearance than before. Originally, she had two funnels, and her immense paddle-wheels detracted from the grace of outline; the new vessel has only one funnel, and looks as she practically is, a new vessel equipped on modern lines.

Professor Biles proceeded to Alexandria in the Mahroussa after her completion; and, in recognition of his services in connection with the alterations, received a decoration from H. H. the Khedive.

NEW BRITISH WARSHIPS.

London Times.

Today, at Portsmouth, the Bellerophon, the second British batleship of the Dreadnought type to be put into the water, will be launched and named by Princess Henry of Battenberg, with the usual religious and other ceremonies prescribed by the custom of the sea. A third ship of the same type, the Temeraire, will be launched at Devonport on August 24, and named by Lady Fortescue. Thus this country will have afloat three of these huge battleships, and one of them actually in commission, at a time when the other European naval powers have done little more than decide to copy the design. The actual position, so far as France is concerned, is that the construction of six vessels of similar type has been authorized; the materials for these ships have been ordered, but it is as yet uncertain whether the keels of any of them have been laid down. In Germany, four similar vessels have been authorized, and the keels of two have been laid down. Russia is merely credited with the intention of beginning a program to include ships of the same character. In the United States, too, progress in this direction is not more advanced than it is in Europe; two similar ships have been authorized, and the contracts for their construction have quite recently been signed with private firms. The only naval power which has vessels of a like character to the Dreadnought in the water is our ally Japan, from whose yards the Satsuma and Aki have been put afloat during the last nine months. The position of this country, therefore, in respect of the most important class of war vessel, the capital ship, cannot be regarded as otherwise than satisfactory.

The Bellerophon, like the Temeraire and Superb, which is building at Elswick, is to be of the displacement of 18,600 tons, or 700 tons more than the Dreadnought, the additional tonnage being, it is understood, distributed partly in weight of hull and partly in armament. In general design, however, these vessels follow closely that of the Dreadnought, although the experience gained in the trials of the latter vessel has been utilized both for improvement in methods of construction and in several important features, which have not yet been made public. As in the case of other ships of novel design, particularly where provided with a new type of engines, a considerable difference of opinion prevails among the engineers as to the form of screw propeller likely to give the best results. Sir William White, at the conference of civil engineers recently, referred to this matter, reminding those present that the turbine-driven propeller was in its infancy, and that some allowance, therefore, should be made for the comparatively small experience with turbine-driven screws. It must be recalled that for over half a century various types of propellers have been tried with reciprocating engines, and yet engineers differ as to which design is the best. The marine turbine has been under trial for scarcely a fifth of that time; it should not, then, be a cause for surprise, much less for alarm, if the authorities should design to try several kinds of screw propellers in the Dreadnought, hoping that with the experience thus gained the most efficient form may be discovered. Similarly, a constant advance in the improvement of ordnance has been maintained, and it is likely that a more suitable gun for the anti-torpedo defense armament has been found in the 4-inch, and that as this weapon will take the place of the 12-pounder of the Dreadnought, some alteration in the disposition of this battery will follow. The disposition of the main armament will not be altered, but a little difference will very likely be made in regard to the turret which stands on the quarter deck —the center one, indeed, of those arranged in the middle line of the ship. The guns in this turret are masked by the after turret for a right-astern fire, and in order to remedy this the turret can be raised until it is on the same level as that which is on the forecastle. This change will have the effect of improving the right-astern fire, as well as giving these guns a wider arc of fire on the beam. It is possible, also, that part of the increased displacement may be used for an increase of defensive armor, but no official information has been vouchsafed on this point. It may be assumed, however, that whatever difference is made, nothing will be permitted to affect the design in a manner prejudicial to the homogeneity of the fleet in which it is intended that all the British Dreadnoughts shall operate together.

The fact that a ship has been

launched and her hull placed in the water does not, as experience in past time has shown, always indicate her speedy completion for service. But in this connection an interesting comparison may be drawn from the case of the Dreadnought, which, laid down on Oct. 2, 1905, was launched 4 months and 8 days later, and completed for her trials in 12 months to a day. The Bellerophon was laid down in Dec. 3, 1906, and is to be launched in 7 months and 24 days from that date. She has, therefore, been nearly twice as long on the stocks as the Dreadnought; but she has had an additional 1,000 tons built into her, the launching weight being 7,000 tons, instead of 6.000 in the case of her predecessor. Even if we assume that she also takes twice as long to complete after launching as did the Dreadnought, she will still be finished by October, 1908, or well inside the two years, the nominal time mentioned for her completion. The Temeraire, at Devonport, will have also been just 7 months and 24 days on the stocks when she is launched in August next, and this is no coincidence, for with both vessels a precisely similar program has been settled—the materials are delivered and built into a prearranged scheme.

STEAM VESSELS MEETING OR CROSSING.

[CONTINUED.]

The rules direct that the vessel required to keep out of the way shall, if the circumstances of the case admit, avoid crossing ahead of the other. But this rule is not imperative, the burdened vessel being required to adopt such course and precaution as is necessary under the circumstances. However, where she attempts to cross the other's bows, she assumes the risk of the maneuver. The rules require that every steam vessel which is directed by the rules to keep out of the way of another vessel shall, on approaching her, slacken her speed, or stop or reverse. A vessel whose duty it is under the rules to avoid another which held her course cannot excuse her failure to keep out of the way unless she shows that at no time after she was near enough to have discovered the latter could she have ported and avoid her. If the proximity is such that stopping is necessary, she must stop at once. The duty to keep out of the way embraces the duty to keep away by a prudent and safe margin, having reference to all the contingences of navigation. The burdened vessel must not approach to closely and under such speed that a sudden checking of the speed of the other or a small unforseen deflection from an unexpected cause results in a collision which would only have been avoided by a small margin had she kept her speed and course. The duty of the steamer having the right of way when approaching another steamer charged with the obligation of avoiding her has been the subject of much discussion both in the English and American courts. That it is her primary duty to keep her course is beyond all controversy. Such is the requirement of the rule of navigation providing that where by the rules "one of two vessels shall keep out of the way, the other shall hold her course and speed." This rule was designed not to confer a favor or privilege, but to impose an obligation in order to enable the other vessel to keep out of the way, and doubtless applies so long as there is nothing to indicate that the approaching steamer will not discharge her own obligation to keep out of the way.

It is not sufficient for the preferred vessel merely to keep her course. In selecting the mode of keeping out of the way, the speed of both vessels must be considered, and the preferred vessel must also keep her speed so as not to embarras the other in executing the proper maneuver. It is no excuse for a tug having the right of way which stopped and reversed that she feared the passage of the other boat would break her tow loose, she having loose towing cleats. A vessel meeting a tug and tow on a crossing course which properly shapes her course to pass free has been held not in fault where, through fault of the tug in slackening speed, the tow does not follow the course of the tug.

The divergence between the authorities begins at the point where the master of the preferred steamer suspects that the obligated steamer is about to fail in her duty to avoid a collision. The weight of English and perhaps of American authorities is to the effect that if the master of the preferred steamer has any reason to believe that the other will not take measures to keep out of the way, he may treat this as a "special circumstance" under Rule 24 "rendering a departure" from the rules "necessary to avoid immediate danger." Some even go so far as to hold it is the duty of the preferred vessel to stop and reverse when a continuance on her course involves an apparent danger of collision. Upon the other hand, some authorities hold that the master of the preferred steamer ought not to be embarrassed by doubts as to his duty, and unless the two vessels be *in extremis* he is bound to hold his course and speed. But it has been settled in this country by the highest authority that the preferred steamer will not be held in fault for maintaining her course and speed, so long as it is possible for the other to avoid her by the proper maneuver, at least in the absence of same distinct indication that she is about to fail in her duty.

However, it is the universal rule that the presence of immediate danger of collision will justify a departure from the rule to keep course and speed. The right of way is not a right to run into unnecessary danger, and immediate danger of collision brings into operation the rule applicable in special circumstances, and each vessel must take such timely and suitable measures to avoid it as are within her power without reference to the original right of way; and notwithstanding the primary fault is that of the vessel bound to keep out of the way, the other vessel is also held in fault for not stopping and backing as soon as the purpose of the first vessel to go ahead is clear and when it is manifest that the other can no longer, by her own efforts, avoid a collision.

[CONCLUDED.]

MARINE PATENTS.

860,664. Bicycle Boat. Lawrence P. Hill, Caratunk, Me.

860,869. Bow Protector for Vessels. George Hollinshed. New York. N. Y.. assignor to Isabelle Hollinshed, White Plains, N. Y.

860,951. Life Boat. Charles W. Weiland, Long Island City, N. Y.

861,045. Boat. William J. Nolan, St. Louis, Mo.

861,134. Vessel Hull. Carey A. Manker, Pearl, Ill., assignor to Manker Heavner Navigation Co., Omaha Neb., a corporation of Arizona.

OBITUARY.

Capt. John Leach, an old vessel master, died at Harper Hospital at Detroit last week.

Capt. James Goslin of New Baltimore, a well-known lake captain, died in Detroit last Saturday at the age of 68 years.

Capt. C. Mason died at the hospital at Ann Harbor this week as the result of an operation. He had been sailing since the civil war, having taken the steamer J. H. Wade out this spring. Capt. Mason had been with the Anchor line for twenty-four years and had sailed steamers for Capt. W. C. Richardson during the last ten years.

The Kronzprinzessen Cecelia will have a decided innovation aboard in the shape of a restaurant open during the full 24 hours. Passengers may have their breakfast at 3 o'clock in the afternoon and supper at daylight if they desire.

SUMMARY OF NAVAL CONSTRUCTION.

The summary of naval construction, issued by the bureau of construction and repair of the navy department, shows the usual rate of progress upon the naval program. It is a steadily diminishing list as vessels are steadily going into commission from the ship yards. Following is the summary:

Name of Vessel.	Speed, Knots.	Building at—	1907. Per cent of completion. July 1.	Aug. 1.
		BATTLESHIPS.		
Mississippi	17	Wm. Cramp & Sons	88.96	90.32
Idaho	17	Wm. Cramp & Sons	81.98	83.98
New Hampshire	18	New York S. B. Co.	75.4	80.00
South Carolina	18½	Wm. Cramp & Sons	17.48	19.59
Michigan	18½	New York S. B. Co.	19.4	21.2
		ARMORED CRUISERS.		
South Dakota	22	Union Iron Works	97.5	98.00
North Carolina	22	Newport News S. B. Co.	83.77	86.34
Montana	22	Newport News S. B. Co.	76.96	80.00
		SCOUT CRUISERS.		
Chester	24	Bath Iron Works	81.26	85.00
Birmingham	24	Fore River S. B. Co.	81.6	82.90
Salem	24	Fore River S. B. Co.	80.8	82.67
		SUBMARINE TORPEDO BOATS.		
Submarine T. B. No. 9		Fore River S. B. Co.	97.00	99.00
Submarine T. B. No. 10		Fore River S. B. Co.	95.00	97.00
Submarine T. B. No. 11		Fore River S. B. Co.	97.00	99.00
Submarine T. B. No. 12		Fore River S. B. Co.	95.00	97.00
		COLLIERS.		
Vestal		Navy Yard, New York	30.7	36.38
Prometheus		Navy Yard, Mare Island	0.7	0.7
		TUG BOATS.		
Patapsco		Navy Yard, Portsmouth	16.00	17.00
Patuxent		Navy Yard, Norfolk	9.00	12.00

SHIP BUILDING DURING JULY.

The bureau of navigation reports 104 vessels of 30,398 gross tons were built in the United States and officially numbered during July, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam			
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
Atlantic and Gulf	6	1,433	31	715	1	63	7	11,654	45	13,865
Porto Rico	....	....	....	....	....	....	....	....	....	....
Pacific	2	782	22	3,502	....	....	....	....	24	4,284
Hawaii	....	....	....	....	....	....	....	....	....	....
Great Lakes	3	41	10	253	....	....	4	11,572	17	11,866
Western Rivers	....	....	18	383	....	....	....	....	18	383
Total	11	2,256	81	4,853	1	63	11	23,226	104	30,398

MISCELLANEOUS PARAGRAPHS.

The steel steamer Winnebago, which is bound for the Pacific coast, took on fuel at Cleveland on Monday last.

The steamer Hemlock, the first of the Lackawanna fleet to go into commission, left Bay City on Sunday last and took on a load of ore at Duluth on Thursday.

The Hamburg-American Steam Packet Co.'s mail steamers are hereafter to call at the port of Ryde, Isle of Wight, instead of at Southampton, thus gaining 1½ hours on their former schedule.

The repairs to the break in the Erie canal at Syracuse are reported to have almost reached completion and it is expected that the canal will again be in commission by Friday or Saturday.

Capt. Amos Fries, Engineer Corps, United States Army, in charge of the dredging and improvements to the harbor at San Pedro, Cal., will recommend the plan to dredge the entrance to the harbor to a depth of thirty feet. This will also cause the whole of the harbor to be dredged to that depth and permit any vessel afloat to come in.

The Pacific Mail Steamship Co.'s recent purchases, the O. & O. steamships Coptic and Doric, are to be rechristened Persia and Asia, respectively. Arrangements have been completed whereby the holding company will be formed in accordance with the British law and the steamships will retain their British registry.

The Hudson river People's line steamer Adirondack, bound north from New York for Albany, took fire Aug. 13 and was grounded at Roseton on the west shore, where her passengers were removed by a steamer of the Citizens' line and a small boat. The fire was brought under control before extensive damage was done.

The barkentine Argonaut, owned by the London Polytechnic Institute, ran aground on a Norwegian fjord recently and her passengers were landed. The vessel was on the rocks but was in no immediate danger, although she was damaged forward. The institute, which is a polytechnic school for young men, conducts continental tours which include cruises on the coast of Norway.

The Neptune liner Tennessee, bound west from Fall River, Mass., to New York, was in collision with and sunk the three-masted schooner Myronus off Stratford Shoal light this week. The Tennessee was only slightly injured but the panic stricken passengers insisted upon being taken aboard the steamer Maine, of the Norwich line. Four of the crew of the schooner lost their lives.

The tug Lincoln, which was built by Crawford & Reid, Tacoma, Wash., for the Buschmann-Thorp Co., of the same city, has been sold by John Fussell, of Ballard, Wash., to the United States government for $10,000. The tug will be used for coaling purposes at the Mare Island navy yard at San Francisco. Her dimensions are: Length, 80 ft.; beam, 17 ft.; depth, 8 ft. She is equipped with a single engine.

The battleship New Jersey was this week presented with a $10,000 silver service, the purchase of which was directed by the legislature of the state of New Jersey. The vessel was lying in the Hudson river at the time of the ceremony of presentation, which was attended by many prominent persons, including Gov. Stokes. The service is said to one of the handsomest ever presented to a warship of the United States navy.

The steamer Ward Ames, building for A. B. Wolvin, will be launched at the Superior yard of the American Ship Building Co. and will be christened by Florence Draper, granddaughter of Ward Ames, in whose honor the ship is named. The vessel is 552 feet over all, 56 feet wide and 30 feet deep. She differs from the ordinary type of lake freighters in that her engines are quadruple expansion and her boilers are of the Babcock & Wilcox water-tube type.

The United States Civil Service Commission announces an examination on Aug. 22 for the purpose of filling two vacancies in the position of marine engineer, one at $720 per annum and rations in the quartermaster's department at large, Fort McDowell, Angel Island, Cal., launch Capt. Smeads, and one at $960 per annum, quartermaster's department, Boston, Mass., launch Florence. Applicants should apply to the United States Civil Service Commission, Washington, D. C.

NINE NEW LINERS.

The nine new Atlantic liners promised by President Bruce Ismay of the International Mercantile Marine Navigation Co. six months ago in his address to the stockholders have been laid down, and the first one, the Alberta, will be ready early next spring for the Canadian trade.

The Alberta will be a new departure in steamers, from the engine-room standpoint. As the company's engineers have not yet indorsed the adoption of turbines, from an economical or practical point of view, they have made a compromise with the Alberta by fitting her with a combination of reciprocating and turbine engines. She will have three propellers, two driven by the reciprocating engines and one turbine which will be in the center, so that the two outer propellers can be used as twin screws in making evolutions, either entering or leaving port or in going astern suddenly.

One of the new steamers will be called the Minnewauska, and will run under the Atlantic Transport flag. She will be larger, faster, and more luxuriously fitted than the present steamers of the Minnetonka class. Family flats, with all modern improvements, located on the promenade deck, will be one of the features, in addition to a number of single berth cabins for travelers who desire to keep aloof from their fellow-passengers.

John Lee, the general manager of the International Mercantile Marine Navigation Co., said that the new steamers were all under way at the various shipyards at Belfast, and on the Clyde, and that it was not yet definitely decided on which route they would be put. The majority would go on the Liverpool-Montreal service, and the remainder would trade between England and New York, he said.

When asked if the White Star Co. had lodged an order with Harland & Wolff of Belfast to build two turbine steamers to compete with the new Cunarders Lusitania and Mauritania, Mr. Lee said:

"We have two new steamers building for the Southampton-Cherbourg service of the Oceanic class, but they will not be any faster. The tendency now for the passenger traffic is to build large steamers with moderate speed.

"We shall wait, however, and watch the developments of the Cunarders, and if they are a success it may make a difference in the machinery and speed of our new steamers."

When questioned about the adoption of turbines in the company's steamers, the general manager said that their success had got to be demonstrated with regard to speed, economy in coal and space, and absence of vibration, so far as big ocean liners were concerned.

Charles Parsons, the inventor of turbine engines, had steadily refused to give any definite figures as to the rate of speed attained by any specified consumption of coal. Lord Pirrie, the head of Harland & Wolff's, at Belfast, had stated that he would build a large turbine liner and guarantee a speed of 30 knots, but that was where his responsibility ended. He did not have to worry over the running of the ship or make out the balance sheet for the stockholders at the end of the year.

The North German Lloyd and Hamburg-American companies also are awaiting the maiden trip of the Cunarder Lusitania to see what happens, as they declare that she will earn less money with passengers than their steamers. The British postmaster general insists that the Cunarders must call at Queenstown instead of landing mail at Plymouth, as they do at present, and going to Cherbourg and Southampton.

COLUMBIA COLLISION.

The board of inquiry which is investigating the recent loss of the steamship Columbia on the Pacific coast has succeeded in obtaining startling evidence to the effect that it is the habit of coast skippers to run their vessels a full speed regardless of fogs, etc., and the chief mate of the San Pedro, in answer to the inspector's question as to why he did not slow down upon the Columbia's fog signal, said that "she seemed so far away." Capt. Hanson, of the San Pedro, who was accused of cowardice by Third Officer Hawse, of the Columbia, gave his testimony in detail, refuting the charges, and revealing the fact that the lifeboats to which he is reported to have refused aid contained only half or less, of the passengers which they were capable of carrying, thus showing that those in charge of the Columbia's lifeboats did not save all the lives possible under the circumstances.

RHONE CANAL.

The French minister of public works has recently approved the project of the department of bridges and roads for the construction of a canal to connect the Valley of the Rhone with the port of Marseilles. As the hills separating the Rhone from Marseilles are too high to be surmounted by a lock canal, the purpose is to construct a tunnel seven kilometers in length at a cost of $6,900,000, which will be the largest in the world. The width of the canal, which will permit two barges to pass at any point, including the tow paths on either side, will be 66 ft. and the height will be 42 ft. The construction of the work will involve the excavation of 2,186,000 cubic meters, as against 1,058,400 in the case of the famous railroad tunnel at Simplon. The total cost of the enormous project will be $15,200,000.

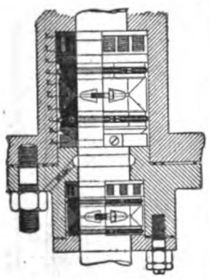
MARINE LABORATORY.

A floating laboratory of marine biology has been established in connection with Trinity College, and Prof. Charles L. Edwards of that institution will act as director. He has given many years of study to this subject. The vessel which is to serve the purpose of a home for this enterprise was launched at Hartford, Conn., this summer and a cruise will be begun which is expected to cover a period of several months. The vessel is a schooner and will be manned by a regular captain and crew, thus leaving the researchers free to pursue their investigations. The itinerary planned covers something over a thousand miles between Connecticut and the coral islands of the Bahamas. Every phase of deep sea life can be investigated from this floating laboratory, as the vessel is fitted with all appliances for obtaining specimens.

REPAIR SHIP CYCLOPS.

The British ship Cyclops, which is said to be the largest repair ship, or floating dock yard, in the world, has left Sunderland for the Tyne to be completed. She was originally an ocean liner but has within the past two years been transformed into a floating workshop by Sir James Laing & Sons. Almost anything required in the navy can be fashioned aboard her. She is of 11,000 tons register, and the lowest deck is fitted up as a foundry for castings, while above are a boiler shop and ship yard machinery. There are also carpenter, blacksmith and armor shops, fitting, electrical and coppersmith departments. She has accommodations for a crew of 300 men.

The docks of the Toronto Ferry Co., at Toronto, Ont., were totally destroyed by fire August 6, together with one steamboat belonging to the company. The docks were built by the city only last year at a cost of $75,000.



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INDEX OF ADVERTISERS

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on page noted.
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CLASSIFIED ADVERTISING SERVICE

PROPOSALS.

PROPOSALS FOR CONSTRUCTING breakwater. U. S. Engineer Office, 813 Prospect Ave. S. E., Cleveland, Ohio, August 10, 1907. Sealed proposals for extension of west breakwater at Fairport Harbor, Ohio, will be received at this office until 2 P. M. Standard Time, September 10, 1907, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. C. McD. Townsend, Lieut. Col., Corps of Engineers, U. S. A.

PROPOSALS FOR CONSTRUCTING breakwater. U. S. Engineer Office, 813 Prospect Ave. S. E., Cleveland, Ohio, August 10, 1907. Sealed proposals for extension of the east breakwater at Cleveland Harbor, Ohio, will be received at this office until 2 P. M. Standard Time, September 10, 1907, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. C. McD. Townsend, Lieut. Col., Corps of Engineers, U. S. A.

U. S. Engineer Office, Milwaukee, Wis., Aug. 2, 1907. Sealed proposals for removing old pier, building pile pier, dredging, etc., at Two Rivers Harbor, Wis., will be received here until 2 P. M. September 3, 1907, and then publicly opened. Information furnished on application. W. V. Judson, Major, Engrs.

U. S. Engineer Office, Jones Building, Detroit, Mich., August 6, 1907. Sealed proposals for hire of dredging plant for use in Detroit River will be received at this office until 3 p. m., August 26, 1907, and then publicly opened. Information furnished on application. Chas. E. L. B. Davis, Col., Engrs.

COAL HANDLING MACHINE

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TWO MARINE BOILERS for sale, 15 ft. 10 in. diameter, 10 ft. 5 in. long; 4 corrugated furnaces each. Address the Griscom-Spencer Company, 229 West Street, New York City.

STEAMERS FOR SALE.

THE LIGHTHOUSE STEAMER Haze, 145 ft. long, 27-ft. beam, 9-ft. draught, 500 tons capacity, 300 horsepower engine and boiler, suitable for passenger or freight business, fully equipped. Steam capstan, donkey boiler. Jacob Ullman, 46 Lloyd street, Buffalo, N. Y.

CITY OF TRAVERSE FOR sale; passenger and freight steamer. Length, 214:5 ft.; breadth, 33.2 ft.; depth, 12.8 ft. Tonnage, 1,153. Steeple compound engine, 650 h. p. Steamer in excellent condition. Owing to the character of the business vessel had been engaged in the past two seasons, many thousand dollars were spent in bringing her up to A-1 condition, $7,000 having been spent alone this spring. Will go as a rare bargain for cash. Address C. H. Colby, 260 State St., Chicago, Ill.

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